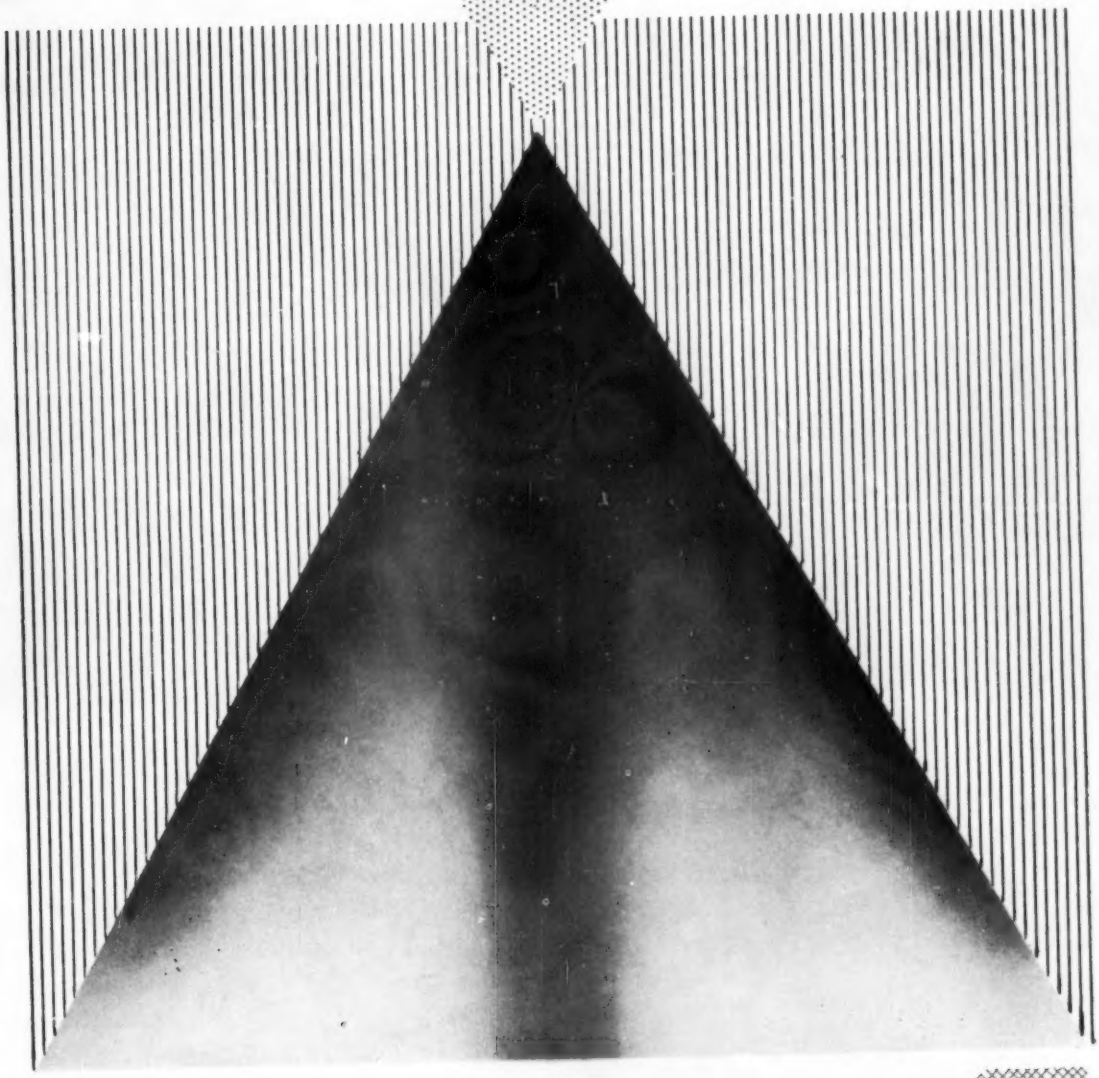
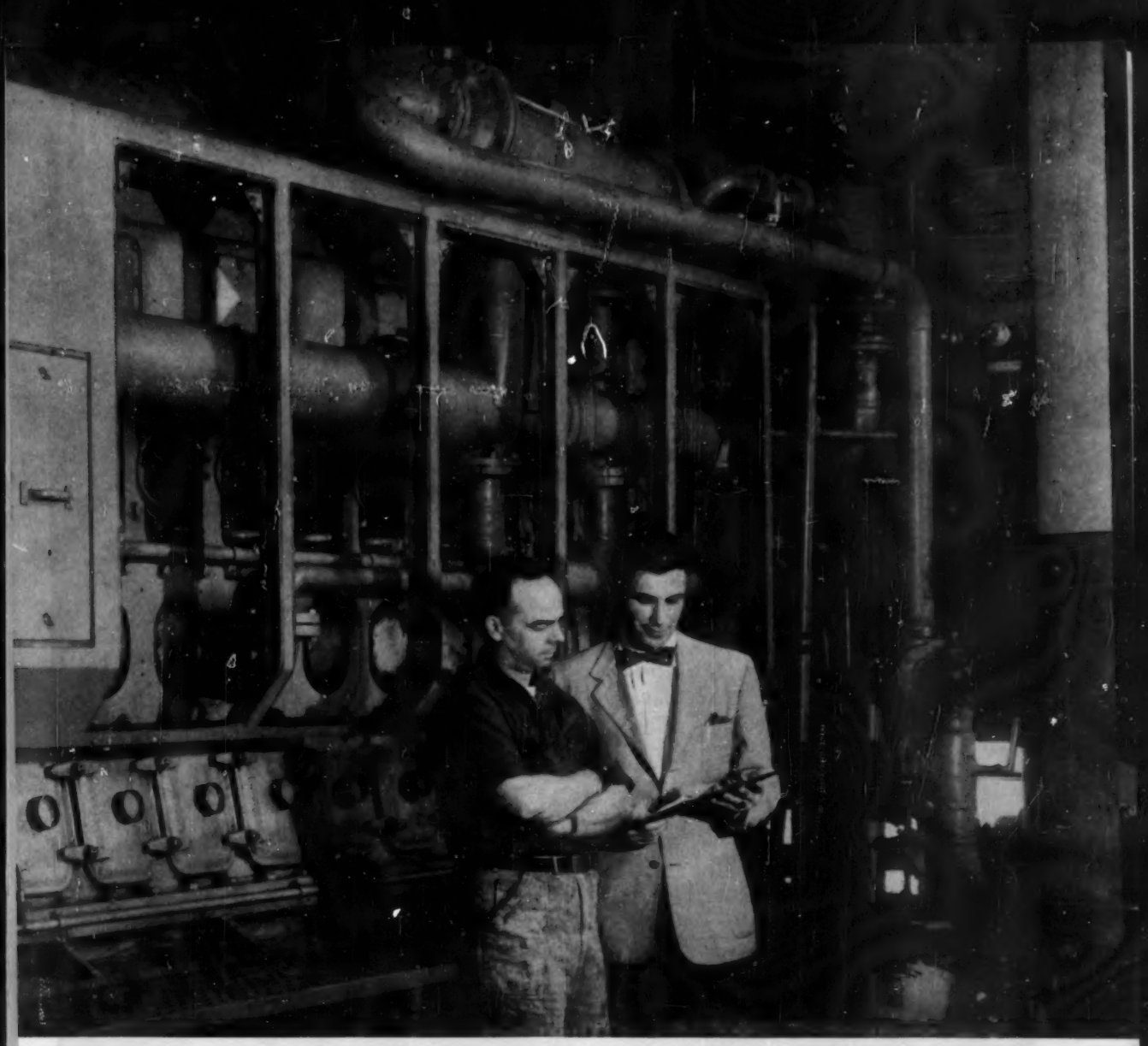
# diesel power

December 1958



# GET MORE POWER

from
less fuel
with
Texaco Ursa Oil Heavy Duty



You get more power from diesels lubricated with Texaco Ursa Oil Heavy Duty because you can be sure the engine will stay free of sludge and harmful deposits. Valves stay clean, and rings stay free, to give you full compression and complete fuel combustion.

Complete combustion of fuel means full power—and less fuel per horsepower. Texaco Ursa Oil Heavy Duty is fully detergent and dispersive—holds all the power-robbing contaminants so the engine itself stays like new: economical, reliable, with fewer overhauls.

There is a complete line of Texaco Ursa Oils for diesel, gas and dual-fuel engines. Your local Texaco Lubrication Engineer will gladly help you choose the right ones for your application. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

**LUBRICATION IS A MAJOR FACTOR IN COST CONTROL**

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

# BEARINGS OF ALCOA ALUMINUM OUTPERFORM ALL OTHER SOLID-WALL BEARINGS...

**Only aluminum has the combination of advantages demanded for the best all-around performance of solid-wall bearings. Alcoa® Aluminum alloys have the unmatched combination of these advantages to give you bearings that:**

*Withstand heaviest loads* . . . Solid aluminum bearings withstand loads up to 10,000 psi on projected area.

*Run cooler* . . . Aluminum is the best heat conductor among bearing materials, and this means cooler running bearings . . . as much as 20° cooler by actual test.

*Conform readily* . . . Aluminum has good ductility, conforms readily to misaligned shafts or nonparallel pins and thus reduces unit loading for longer bearing life.

*Have ideal embeddability* . . . Aluminum embeds particles far better than bronze, but not as deeply as babbitt. Dirt particles roll out easily and are trapped by the filter.

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*Have design flexibility* . . . The structural properties of aluminum give great design flexibility, ease of machinability.

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ALCOA ALUMINUM BEARINGS

ALUMINUM COMPANY OF AMERICA

*Your Guide to the Best in Aluminum Value*

"ALCOA THEATRE"
Exciting Adventure,
Alternate Monday Evenings

## *Unique packing retention method eliminates test rings*

*simplifies inspection and servicing reduces maintenance time*

# Paracoil

TYPE "PC" EXCHANGER

***Straight-tube exchanger for oil, water, air or gas***

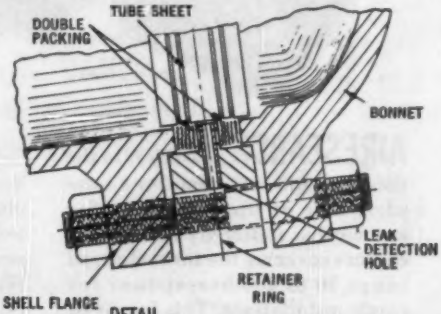
Leak detection holes in retainer ring show leakage from either tube or shell sides (See detail below).

Exclusive "retainer ring" design, available only in Paracoil "PC" Exchangers, **permits shell side pressure test with bonnet removed. No auxiliary equipment or special devices are required to hold tube sheet packing against pressure.** By backing off only one set of nuts, bonnet may be removed without displacing packing or retainer ring. Pressure may be applied to shell side to test for defective tubes or leaking tube joints. With bonnet off, retention studs hold retainer ring and packing in place.

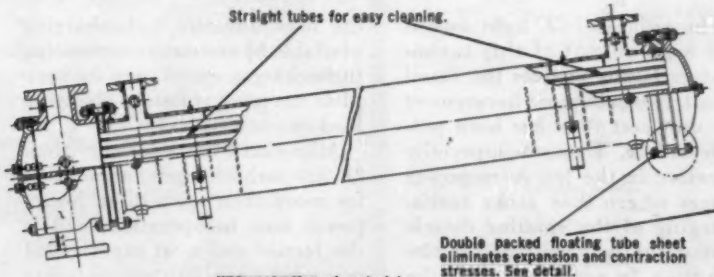
Tubes may be tested, re-rolled, even replaced, without removing tube bundle from shell.

Tube bundle easily removable from shell without disturbing oil piping connections

Close tolerances between tubes and tube holes in baffles, and between baffle periphery and shell, assure maximum heat transfer.




DETAIL — *Section thru floating tube sheet showing packing and detection hole in retainer ring.*



Straight tubes for easy cleaning.

Double packed floating tube sheet eliminates expansion and contraction stresses. See detail.

Wide selection of materials as dictated by service requirements.

Standard commercial, ASME or Marine Code construction.

**HOW IT WORKS**

**Mixing of shell and tube side fluids due to packing failure is impossible in this Paracoil Type "PC" design.** Any leakage from either side, resulting from loosening of bolts or worn packing, escapes through the detection holes. The operating personnel is thus on notice that servicing is required.

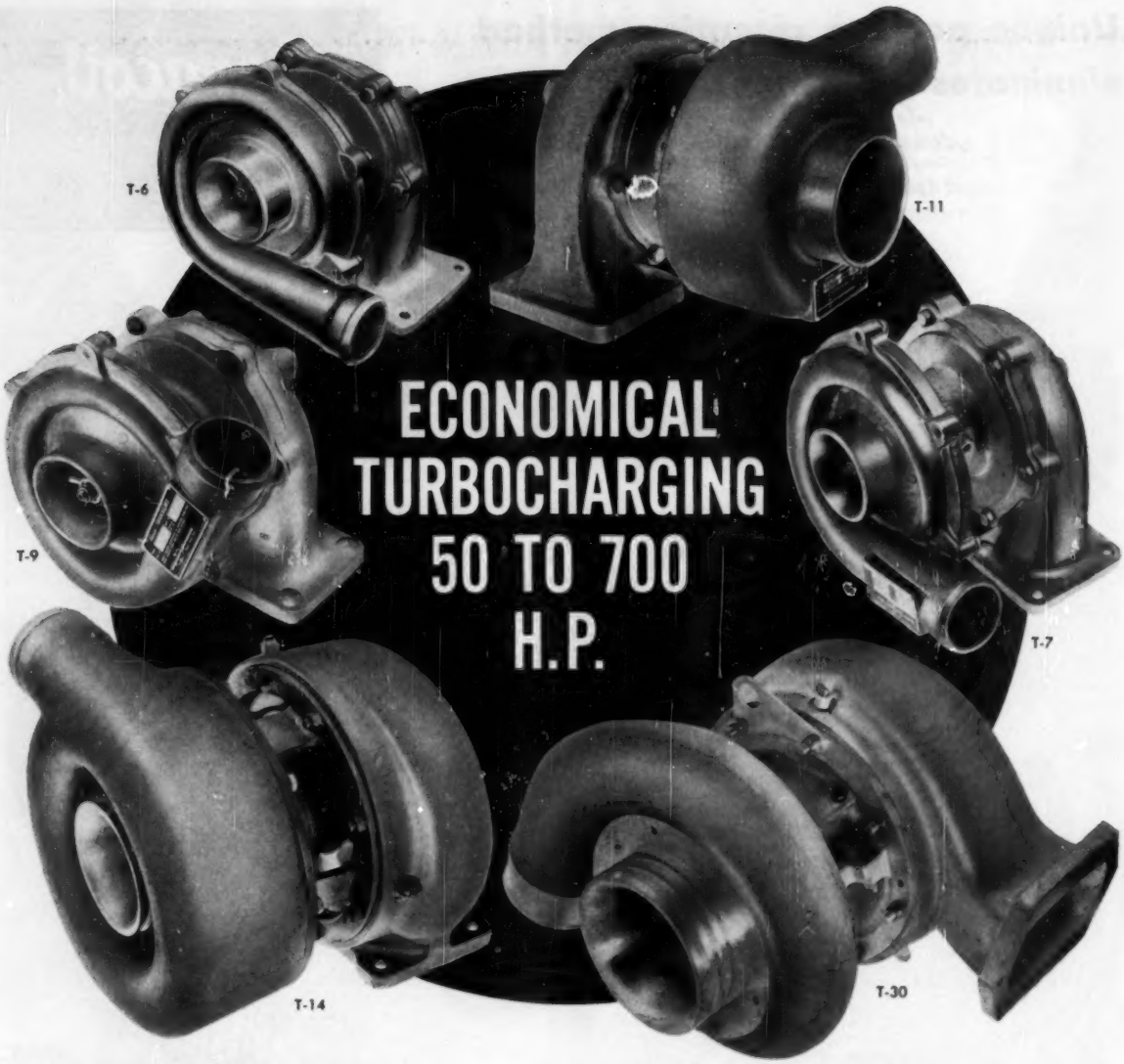
Paracoil
HEAT TRANSFER EQUIPMENT

***Write for descriptive Bulletin 140***

Since 1915

## DAVIS ENGINEERING CORPORATION

30 Rockefeller Plaza, New York 20, New York

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AiResearch has sold more than 20,000 turbochargers, accounting for more than six million horsepower now in operation, and is the largest and most experienced manufacturer of lightweight turbomachinery of all types.

Your inquiries are invited.

THE GARRETT CORPORATION

AiResearch Industrial Division

*9225 South Aviation Blvd., Los Angeles 45, California*

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BPA

# diesel power

**Established in 1923 Vol. 36, No. 12 December, 1958**

**The Magazine of Piston and Turbine Power**

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**Diesel Publications, Inc., 80 Lincoln Avenue, Stamford, Conn.**

Taper threaded type D-2 Ni-Resist ductile iron insert rings are checked in a ring gauge prior to installation in block.

# How Ni-Resist ductile iron can help you "run rings around" corrosion, high temperatures

Made of Ni-Resist* ductile iron, these sealing ring inserts are used to overcome a major problem in marine diesels . . . corrosion of the lower horizontal water land seal between liner and engine block.

How corrosion-resisting are they?

After four years service, inspection revealed – "no sign of corrosion or pitting!"

The method of installing these rings, developed by Whaley Engineering Co., San Diego, illustrates the strength and ductility of this corrosion-resisting metal. Engine block openings are too small for the ring inserts to fit through. The Ni-Resist ductile iron rings are deformed and passed through the openings. Once inside, they're reformed to their original shape without danger of cracking.

**Is cost high?** No! The parts are produced economically because of easy castability and machinability of Ni-Resist ductile iron. There are other important uses for Ni-Resist ductile iron in diesel engines. These uses depend upon still other characteristics of the alloy.

**Take exhaust manifolds, for example:**

In an application like this, Ni-Resist ductile iron can withstand temperatures up to 1400°F. It resists corrosive attack by hot exhaust gases and oxidation. Eliminates troublesome flake-off. And because of its low coefficient of expansion it resists cracking and thermal shock.

**Get the complete facts!** Write for the 64-page booklet, "Engineering Properties and Applications of Ni-Resist."

*Registered trademark

**THE INTERNATIONAL NICKEL COMPANY, INC.**
67 Wall Street — New York 5, N. Y.

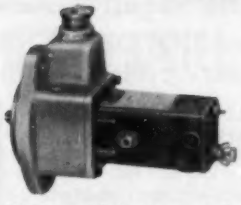
# NI-RESIST

## NICKEL ALLOYED IRONS PERFORM BETTER LONGER

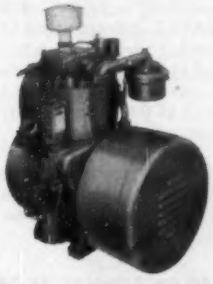
# NEW!... precision speed regulation

with world's smallest

## HYDRAULIC ISOCHRONOUS GOVERNOR



**Model "LE" with pump and sump. Runs horizontally, providing exceptionally large work capacity for its size.**



**Model "LE" on American M.A.R.C. Diesel Generator Unit.**

Measuring only 2 inches square by 4 inches high, the compact Curtiss-Wright "LE" Governor is a true hydraulic isochronous governor.

Weighing only 1½ pounds, it performs an efficient job of speed regulation on small engines at 2,000 to 4,000 r.p.m.

**Write for descriptive brochures—CURTISS-WRIGHT CORP., Marquette Division, 1146 Galewood Dr., Cleveland 10, Ohio. No obligation, of course.**

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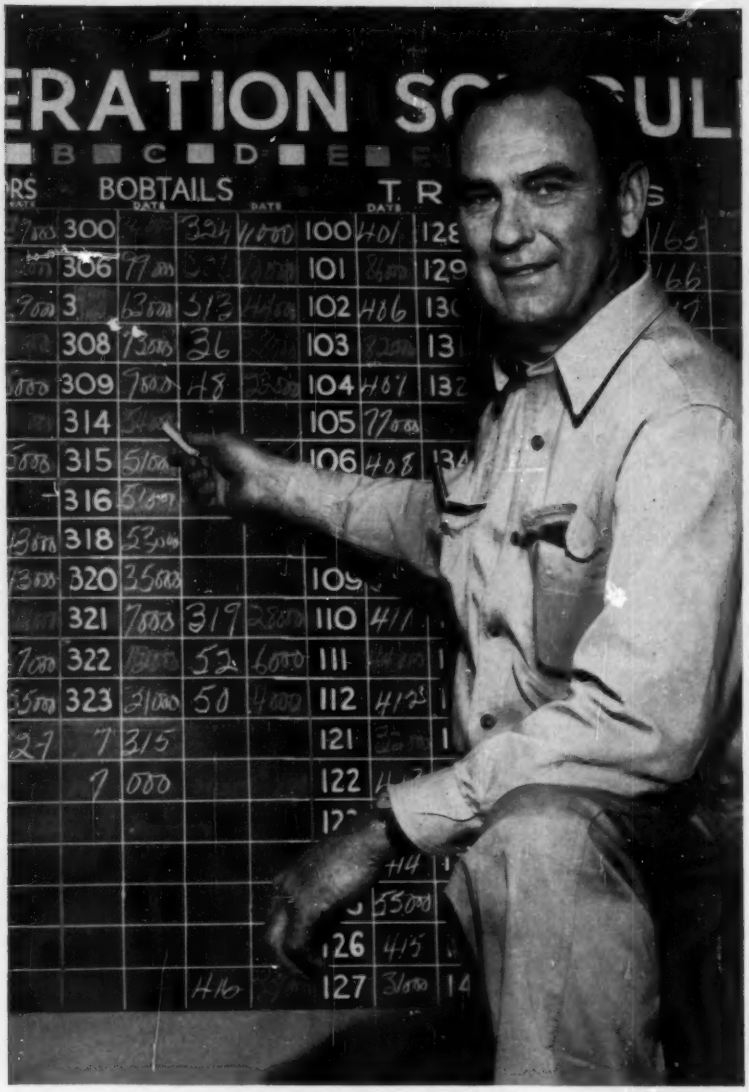
ENGINEER'S FIELD REPORT

PRODUCT **RPM DELO Oil**

FIRM **STERLING TRANSIT CO.**
**Montebello, California**

# 350,000 miles on RPM DELO before rebuilding




**Using RPM DELO Oil,** Sterling Transit Co.'s 15 diesel tractors run an average of 250,000 miles before overhaul. "In fact, we get 350,000 to 400,000 miles out of them before engines are removed for rebuilding," reports Maintenance Manager Bill Schuster (above). "Regular oil changes are an important part of our preventive maintenance program. This color-coded chart indicates the mileage and condition of any unit in our 82-truck fleet...and these records show that RPM DELO Oil is doing a good job."

LUBRICATING OILS RPM DELO

TRADEMARKS "RPM DELO" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

**STANDARD OIL COMPANY OF CALIFORNIA,** San Francisco 20
**THE CALIFORNIA OIL COMPANY,** Perth Amboy, New Jersey

**800-mile round trip** between Oakland and Los Angeles is regular run for firm's big Kenworths and Internationals. Mr. Schuster makes frequent dipstick checks (above), reports make-up RPM DELO Oil for trip averages only 5 quarts. Older trucks use cleanable filters; newer units, replaceable cartridges. All use RPM DELO Oil exclusively.

## Why RPM DELO Oils reduce wear—prolong engine life

- Oil stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrosion of bearing metals
- Inhibitor resists crankcase foaming.

**For More Information** or the name of your nearest distributor, write or call any of the companies listed.

**STANDARD OIL COMPANY OF TEXAS,** El Paso
**THE CALIFORNIA COMPANY,** Denver 1, Colorado

Two of the three 175-ft. legs of mobile tripod-type platform with two-well derrick at right. The legs can be raised or lowered one foot per minute. Circular deck on top of leg at left is for helicopter landings.

# NOW BENDIX FUEL INJECTION HELPS DRILL TO 25,000 FT. IN 100 FT. OF WATER

A new mobile offshore drilling platform, the "Julie Ann", combines the desirable features of both mechanical and electric drill rigs. It is powered by three 834 HP, 900 rpm White Superior diesels equipped with Bendix Fuel Injection.

The especially-designed power package, located on the main machinery deck, was built by the Diesel Engine Division of The White Motor Company, whose engines are noted for smooth powerful performance with quick response to load.

Constructed by R. G. LeTourneau, Incorporated, the "Julie Ann" is owned and operated by Dixilyn Drilling Corporation of Odessa, Texas—one of the foremost offshore drilling concerns. The platform is designed to drill six holes in a single location to depths of over 25,000 ft. while operating in over 100 ft. of water.

The ability of Bendix* Fuel Injection to meet the highest standards of unusual as well as conventional applications is another reason why more diesel engine manufacturers are specifying Bendix than ever before in history. *REG. U. S. PAT. OFF.

Export Sales & Service: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.

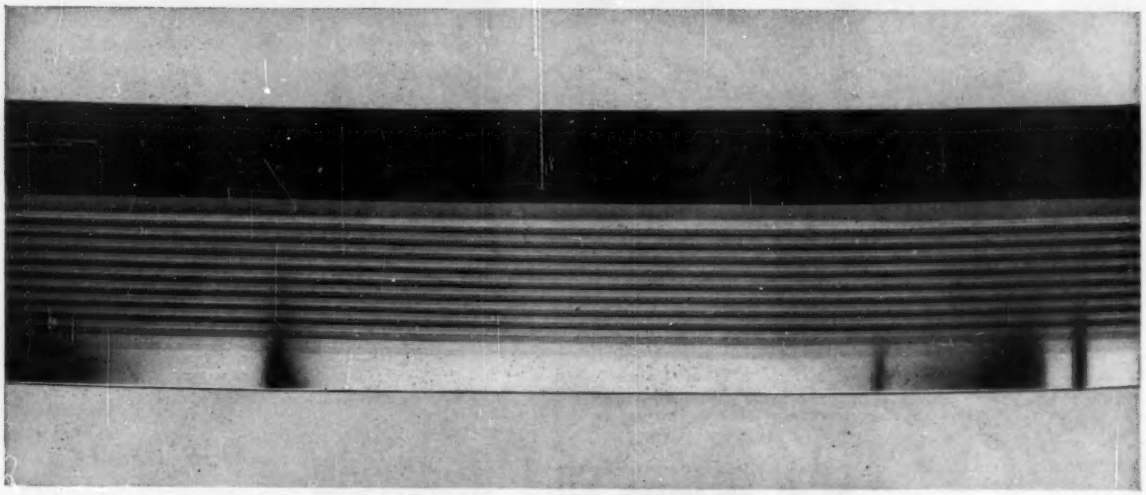
One of three White Superior diesels equipped with Bendix Fuel Injection. This engine provides mechanical drive for a main mud pump and electric power for motors driving draw-works and independent mud pump.

Scintilla Division
Sidney, New York

Bendix
AVIATION CORPORATION

# Reduce break-in time by as much as 80%!

## *with factory pre-seated full chrome* PEDRICK PISTON RINGS



*Bright highlight along lower face of ring shows area pre-seated by factory lapping.*

Use of PEDRICK Chrome Piston Rings reduces break-in time by as much as 80% . . . allows the engine to be put under full load very quickly. This is because PEDRICK laps or pre-seats its Chrome Rings to cylinder size *at the factory*. PEDRICK Chrome Rings are the most modern twist-seal and/or taper face designs, which further speeds seating and helps provide a quick, positive seal.

All PEDRICK Chrome Rings have a full Chrome coating. Chrome coating on a PEDRICK Ring is never less than .006 inches and may be as much as .010 or .012 inches thick depending upon the size of the ring and the use for which it is intended. On PEDRICK Chrome Rings, thickness of the Chrome coating is measured *after* the lapping operation.

PEDRICK Full Chrome Rings resist scuffing, withstand high temperatures, abrasion and corrosion.

Include PEDRICK top Chrome Rings in your replacement ring sets and increase ring life by as much as four times. A PEDRICK engineer will be glad to call and help you solve any special problems. Write, wire or phone: WILKENING MANUFACTURING CO., Philadelphia 42, Pa., SAratoga 9-3770.

Pedrick PISTON RINGS

**PEDRICK PIONEERED CONFORMABLE PISTON RINGS FOR BIG-BORE ENGINES**

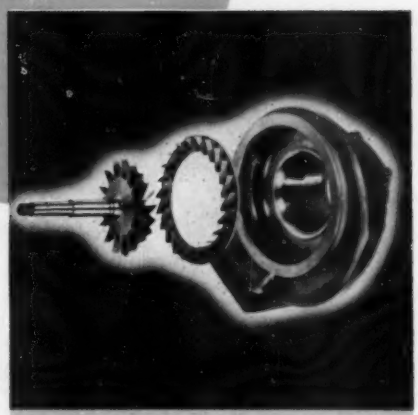
# Editorially speaking -

### A Parable for the New Year

One day, the old man called unto him his son and spake thus, "Long have thou considered me dull-witted and lacking the new ideas of thy generation. Now, thou shalt run the enterprise I have wrought and make and sell the engines called diesel. I ask only a percentum from thy profit to keep me in my old age." And the son, thanking his sire, promised him great pride in the things to come. Then there was great stir where the machines were made, with much coming and going. Yet when a year had passed, the father found no silver for him. Again he spake unto his son, inquiring, "How come?" Quoth the son, "Bad times have fallen upon the land, sire. Few are the engines bought. Yet I have built the engine to my liking and it is good. To protect our engine, those who buy must come to us to have them restored for we alone know how. Yet we have knocked on all our old customers' doors and they buy not." Then the father spake with anger, "Thou hast not learned the lessons I assayed to pound into thy thick head. Blame not the times. Many of those I strove against in the past selleth their engines. Engines are sold, not bought. Then too, it matters not a tittle that the engine is to thy liking. Dost thou buy them? Find the needs in this vast land and supply them. Supply inspiration in thy efforts. Beat on old doors but seek ever new ones. And forget not service. The engine thou selleth is no longer thine. Thou canst not control where and how it shall be repaired. Be not afraid to tell all. For a machine not working is like unto a dead horse—it is of no value and hard to hide. This, then is the path I bid thee follow." And the son did at last see sense in his venerable sire who had climbed by a hard and rough path. Again there did occur change and much [illegible]vity. In time the old man did get his percentum and the sum made him proud as his son had promised.

Moral: Few people ever went broke giving the customer what he wanted and needed, at a price that he could afford, and backed up by real service.

BPE



# NEW! Prompt response to speed and load changes with Thompson Turbocharger

Moving parts in the new-design Thompson Turbocharger for diesel engines are made of light alloys to reduce inertia to speed changes. Response of the Thompson Turbocharger to variations in engine speed and air requirements is almost instantaneous . . . no ragged engine performance due to lag in blowing.

The light alloy impeller also permits bearings to be simpler in design. Shafts can be smaller in diameter to reduce bearing surface speeds and increase bearing life.

Other advantages of the new Thompson design include: straight-bladed impeller for high pressure ratios over wide range of air flow, new-design diffuser for peak performance over wider operating range, and unique design to isolate exhaust heat from bearings and air-side of Turbocharger.

Your diesel engines up to 300 horsepower can readily be equipped with Thompson Turbochargers . . . the most modern design available. A Tapco Group engineer will call at your convenience to work with your engineers.

Write today on your company letterhead for Booklet DP-1258, which contains technical data on Thompson Turbochargers for blown diesel engines up to 300 horsepower.

**TAPCO GROUP**

***Thompson Products, Inc.***

CLEVELAND 17, OHIO

# highlights

**Truck-trailer refrigeration is under study** by National Bureau of Standards. Objective is to develop standard lab rating method for simulating highway heat-transfer conditions in refrigerated truck trailers. While they're at it, it's a good opportunity to study diesels as a standard form of cheap, dependable power for the mechanical reefers.

**Army has contracted for design and construction of the 450-ft R. G. LeTourneau overland train.** It will be used for transporting heavy cargo in the Arctic, desert or other remote areas. Electric motors geared directly to the rims of all 52 wheels of the 12-unit vehicle will be powered by diesel-generator sets.

**"It's going to be bumpy; fasten your seat belts."** Turbulence aloft is nothing to running a Cat over rough terrain. So its no surprise that Caterpillar has announced seat belts to increase operator safety and comfort when working in rough terrain with track-type tractors. Seat belts attachments are available for all current models, as well as for all former Cat-built track-type tractors.

**Silver anniversary of the American Trucking Association founding** was celebrated by America's organized trucking industry. This took place during the Annual Convention at Miami Beach Nov. 16-21. The ATA, a federation of 50 state associations of trucking operators, was formed in Washington on Sept. 23, 1933. Some 3,245,000 trucks were registered then in the U.S. Now over 10-million trucks are registered with about 7-million people employed by the trucking industry.

**A B.S. degree for selling bulldozers.** That's what Clarkson College of Technology, Potsdam, N.Y., will give starting September, 1959. A curriculum in "Construction Equipment Distribution", including practical training in marketing of earth-moving, roadbuilding and other construction equipment, will be given. This program is an outstanding example of cooperation between a leading industry and education. Associated Equipment Distributors, a national organization of companies distributing construction equipment, are giving support and financial backing in planning and establishing the program.

**Ordnance is contemplating more extensive use of diesels in vehicles** according to r e l i a b l e sources. This is to take place in the very near future. Steps have already been taken to set up an indoctrination program for training Army maintenance personnel for the switch.

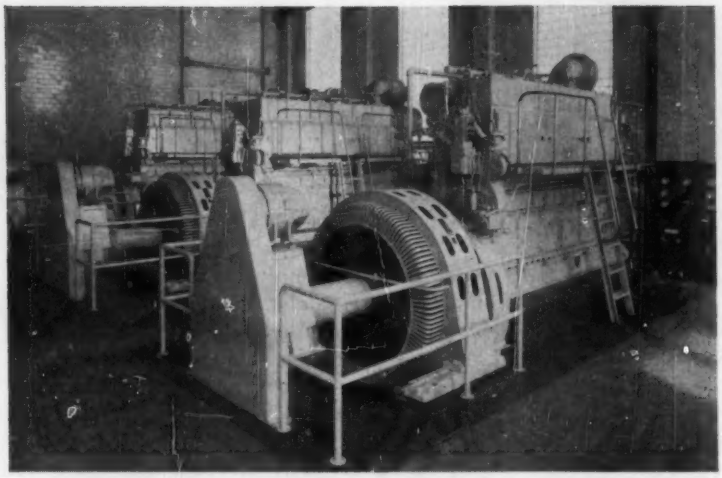
**First of 25 longest flat cars ever built for trailer-on-flat car (piggy-back) freight service** has been completed in the Santa Fe shops at Topeka, Kan. It has a loading surface-length of 88-ft and a width of 9-ft 6-in. Use of this revolutionary equipment will enable the Santa Fe to offer a more efficient piggy-back service to the shipper

**Paris Auto Show featured a diesel car** said to run on animal, vegetable or mineral oil without adjusting for changes in fuel. The engine, made by Berliet, is also said to have a high power output. using any given fuel, as compared to engines of similar size.

**Missiles mean big diesel business.** For example, five diesel engines are being installed as ground power units for a single Bomarc missile operation on Long Island. Four White Motor Co., diesels will each drive 1000-kw generators. A smaller diesel will drive a generator at the GAT site 2½ miles distant from the launcher-shelters.

**English diesel-powered light vehicles are now using automatic transmissions.** An Austin diesel taxi with automatic transmission was recently exhibited. The streamlined taxi is powered with a B.M.C. 55-hp, 3500-rpm diesel engine and Borg-Warner fully-automatic transmission. Other features include independent front suspension and separate heater control for driving and passenger compartments.

**Greater use of bronze castings for diesel parts is foreseen** in the new research data compiled at Battelle Memorial Institute under sponsorship of the Brass & Bronze Institute. This indicates that diesel engine parts such as gears and pump parts can be made of bronze. Until this new authoritative data on 16 mechanical and physical properties of three copper-base alloys became known, bronze had not been considered strong enough.



*Three 693-kw Worthington dual-fuel generating sets at Jersey City's West Side sewage treatment plant. These units furnish all the power necessary to operate all equipment in both of Jersey City's sewage treatment plants. Dual-fuel engines run on sludge gas, a by-product of the high-rate activated sludge process used at the sewage treatment plants.*

# Jersey City Cuts Costs Of Sewage Treatment

**Sludge gas, a by-product of the high-rate activated sludge process of sewage treatment, is used in dual-fuel engines to provide plant power at minimum cost. When building or expanding sewage disposal facilities, the potential economy of this design should be kept in mind. It pays off.**

SEWAGE disposal is a growing problem. It is also a growing potential for the sale of dual-fuel engines. With larger, more heavily populated areas to be served, sewage disposal facilities are continually being expanded and improved. These activities are being pushed both for reasons of health and by the growing demand for clean water areas for recreational purposes.

One effective method of sewage treatment is the activated sludge process. A byproduct of this process is high-methane sludge gas. Used as a fuel in dual-fuel engines, it provides low-cost power to operate plant equipment. This cuts the cost of this necessary service to the taxpayer — always an enviable goal.

The Hyperion Sewage Treatment Plant in Los Angeles and the many plants in New York City are prime examples of the effectiveness of the activated sludge process and its low cost through usage of dual-fuel engines. New York City has done a fine job in cleaning up its waters. But every river has two sides — and both have to be kept clean if pollution is to be eliminated.

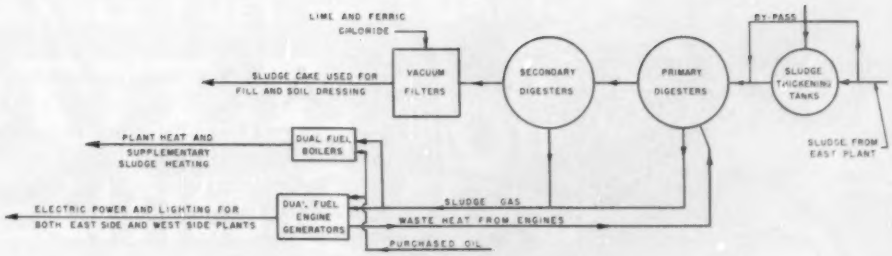
Jersey City, across the Hudson River, is doing its part. They have two plants with an interesting and unique method of operation. Since Jersey City is located on a ridge, it has natural drainage down two slopes. Sewage and storm water flow by gravity to either of two plants —the West Side Plant on the Newark Bay bank or the East Side Plant on the New York Bay bank. One unique feature of these plants is that the dual-fuel engine generating sets and sludge processing equipment for making the gas are all in the West Side Plant. Its equipment, as well as that of the East Side plant, is powered by these generating sets.

### Sludge Treatment

At each plant, trash and grit are removed from sewage wastes and the sewage is pumped into sedimentation tanks. Here, floating and settled solids are collected. Collected fresh sludge from both plants is pumped to sludge-thickening tanks located at the West Side Plant. Clarified effluent from the East Side Plant is treated with chlorine and flows into the Hudson River.

Another unique feature of these plants is that they are connected by a right-of-way obtained from the Jersey Central Railroad. Sludge from sedimentation tanks in the East Side Plant is pumped through pipes in this right-of-way to the sludge-thickening tanks. Power lines in this same right-of-way are used to transmit electricity from the generating units to run the motor-driven pumps in the East Side Plant and for lighting. Much time and expense were saved due to the availability of this right-of-way.

Sludge from the sludge-thickening tanks is then heated and treated in primary and secondary digesters. One product resulting from this treatment is sewage


LIME AND FERRIC CHLORIDE
BY PASS
SLUDGE CAKE USED FOR FILL AND SOIL DRESSING
VACUUM FILTERS
SECONDARY DIGESTERS
PRIMARY DIGESTERS
SLUDGE THICKENING TANKS
SLUDGE FROM EAST PLANT
PLANT HEAT AND SUPPLEMENTARY SLUDGE HEATING
DUAL FUEL BOILERS
ELECTRIC POWER AND LIGHTING FOR BOTH EAST SIDE AND WEST SIDE PLANTS
DUAL FUEL ENGINE GENERATORS
SLUDGE GAS
WASTE HEAT FROM ENGINES
PURCHASED OIL

*Flow diagram of the West Side sewage treatment plant which is located on Newark Bay.*

sludge gas. This gas is burned in three Worthington dual-fuel engines direct connected to 693-kw Electric-Machinery alternators. The 4-cycle Model SDGRO, supercharged dual-fuel units are all 6-cyl engines with a 13½-in. bore and 17½-in. stroke. Each is rated 990-hp at 450-rpm and a bmep of 120 psi.

Sewage gas is not available when starting up the plant. Nor is it available in sufficient quantities at all times for full-gas operation of the dual-fuel units — hence the need for dual-fuel engines rather than straight gas engines. The capability for using oil is important for dead-plant starting and during periods of low gas availability. Need for commercial power ties, involving demand charges, is eliminated.

The dual-fuel engines give another money-saving service. In addition to powering plant equipment and providing lighting, they are the major source of heat for heating the sludge in the digesters. Waste-heat recovery equipment used in conjunction with the engines utilize heat from the engine exhaust and cooling water for this purpose — nothing is wasted in this plant.

The engines are designed to operate on proportions of oil and gas varying from 94% gas and 6% pilot oil to 100% oil. If the gas supply should fail or decrease, the governor automatically makes the fuel pumps increase fuel oil to maintain load and speed.

Fuel oil is pumped to the engine from three 200-gal service tanks by motor-driven rotory pumps. The gas comes from digester tanks at a pressure equal to about 3½-in. of water. This pressure is boosted to 30 psi by two Worthington 10-in. by 9-in., Model HB, horizontal, water-cooled, 223-cfm compressors. Each is belt-driven by a 25-hp, 1800-rpm, enclosed, fan-cooled motor.

## Other Plant Equipment

Plus using the oil and gas in the engines, these fuels are also used in dual-fuel boilers. These boilers are used for plant heating and for supplementary heating of sludge. If there isn't enough gas to fire the boilers, oil can be used as fuel.

Starting air for the units is supplied by one motor-driven and one gasoline engine-driven air compressor.

Major equipment being electric powered in the West Side Plant by the generating sets are four Worthington vertical, motor-driven mixflo pumps. The pumps are located on the bottom floor of the plant and are connected by vertical shafting and flexible couplings to Electric Machinery motors on the floor above. Two of these motors are 150 hp each, one is 300 hp and one is 350 hp. The East Side Plant also has four motor-driven pumps. Their arrangement is the same but the sizes are different, two are 250-hp and two are 500-hp units.

From the number and sizes of the above motors, plus the requirements for digester heating, it's clear that plant power demand is high. The lion's share of this power is provided by byproduct gas.

## Conclusion

To handle the wastes from Jersey City's population of over 300,000 and still meet the health standards set up by the Interstate Sanitation Commission is quite an accomplishment. That this is done at minimum expense to the taxpayer is a tribute to the dual-fuel engines that make this possible by operating on a gas which is a by-product of the sewage treatment itself.

Community engineers planning the building or expansion of sewage disposal facilities and consulting engineers specializing in their design would do well to keep in mind the activated sludge process. It is this method of sewage treatment that produces the sludge gas that makes possible the use of dual-fuel engines for economical powering of plant equipment.

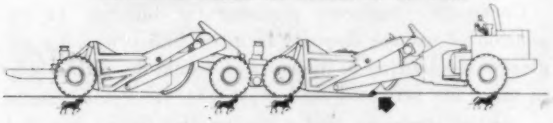
### Major Equipment

| | |
|---|---|
| Dual-Fuel Engines | Worthington Corp. |
| Turbochargers | Elliot Co., Inc. |
| Governors | Woodward Governor Co. |
| Alternators | Electric Machinery Mfg. Co. |
| Switchgear | Westinghouse Electric Co. |
| Fuel Injection Systems | American Bosch Arma Corp. |
| Fuel Filters | Morris Company |
| Fuel Meters | Worthington Corp. & Gammon |
| Fuel Tanks & Gas Receivers | Buffalo Tank Corp. |
| Fuel & Lube Oil Transfer Pumps | Worthington Corp. |
| Lube Oil Purifiers | The Hilliard Corp. |
| Centrifuges | The Sharples Corp. |
| Lube Oil & Jacket Water Coolers | Simms Co. |
| Jacket Water Pumps | U. S. Electric Motor Co. |
| Water & Oil Temperature Controls | Minneapolis-Honeywell Brown Instrument Div. |
| Air Inlet Silencers | Air Maze Corp. |
| Starting Air Tanks | Buffalo Tank Corp. |
| Starting Air Compressors | Worthington Corp. |
| Gas Booster Compressors | Worthington Corp. |
| Pyrometers | Illinois Testing Lab., Inc. |
| Waste Heat Boilers | Worthington Corp. |

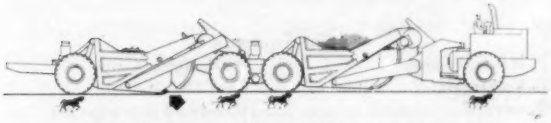
# Twin-Bucket Scraper Holds 130-Ton Load

**R. G. LeTourneau's biggest earthmover features tremendous capacity and self-loading—both important in cutting time and costs of big earthmoving jobs.**

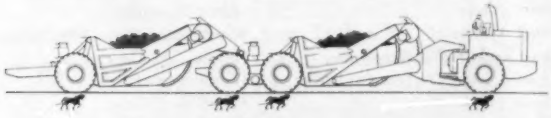
**HOW EIGHT ELECTRIC WHEELS AND DOUBLE BUCKET NOW MAKE POSSIBLE SELF-LOADING OF 130 TONS**



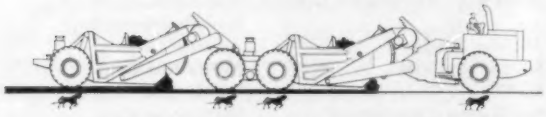
LOAD ONE: While front bucket of giant super-earthmover scrapes up 65 tons of dirt to load itself, empty rear bucket (with motor in each wheel) serves as auxiliary "pusher" to make job easier and faster.



LOAD TWO: While rear bucket loads itself with identical amount of dirt, the increased traction provided by load in front bucket serves as highly effective "puller" to complete overall loading operation.



TRAVEL: Electric motors inside all eight wheels are geared to propel the super-scooper and its 130-ton load at about 16 mph. Whether going forward or backward, machine has identical speed and power.



SPREAD: Much versatility is available in emptying load. Front bucket can spread at given depth, as rear bucket deposits a spread atop first layer — or spreads can be single depth and continuous.

A NEW concept in earthmoving has been introduced by R. G. LeTourneau's newest and biggest earthmover. This 130-ton unit is expected to revolutionize dam-building and canal-digging methods. For example, it is estimated its use would cut digging of a new Panama canal to less than one-fourth the time otherwise required.

The machine responsible for this is a huge self-loading mountain mover. It is more than 100 ft long and has the power of a locomotive. However, a single operator, with one hand on a panel of pushbutton controls, is in complete command. This operator can dig a boxcar full of dirt, haul it to any location, then spread it with an even finish.

Two giant buckets are used to hold the 130-ton load. Both are integral parts of the machine. They can load themselves separately and discharge their loads either together or separately.

The new earthmoving concept eliminates use of separate tractors to push the scraper. As shown in the photo, while the front bucket scrapes up to 65 tons of dirt to load itself, the empty rear bucket, with a motor in each wheel, serves as an auxiliary pusher. This makes the job go easier and faster.

While the rear bucket loads itself with an identical amount of dirt, increased traction provided by the load in the front bucket plus power from a motor in each wheel makes this front bucket an effective puller. Electric motors in all eight wheels, powering the complete unit at all times, can move the scraper at 16 mph forward or backward.

### Machine Operation

The most important factor making the new powerful earthmover possible is LeTourneau's electric-wheel system of propulsion. The system was first perfected for use on huge jungle-clearing machines, off-road trains, 4000-ton offshore drilling platforms, and other large equipment.

The new unit is powered by two 600-hp Cummins diesel engines driving a-c and d-c generators under the hood. The d-c generators furnish power to drive big d-c electric motors which are geared directly to the rims of eight wheels. The alternators furnish power to drive a-c motors which are used for steering and for operating the loading and unloading mechanisms. All power is transmitted by electric cables thus avoiding use of mechanical drives.

It was only nine weeks prior to introducing this 130-ton capacity unit that LeTourneau unveiled its first earthmoving machine since selling that phase of its business in 1953 for $31-million. This first machine was billed as "the world's biggest earthmoving scraper" and also as having more than twice the work capacity of any other machine of its kind on the market.

This new $200,000 earthmover has almost twice again the load capacity—and more than twice again the work capacity—of that "world's biggest" which LeTourneau announced such a short time ago.

DIESEL FUEL and LUBRICATION

# BULLETIN

CITIES SERVICE

## The Bradford Weston Story:

# 16,000 HOURS WITHOUT OVERHAUL!

Bradford Weston Inc., of Hingham, Massachusetts is getting the kind of diesel performance many a maintenance man dreams of.

Since 1947, their diesel quarry shovel has operated more than 16,000 hours without overhaul, using Cities Service Diesel Engine Oil!

Two factors enabled this performance. First, due to extremely dusty conditions, Bradford Weston made oil changes every 150 hours and changed filter every 500 hours. Second, the extremely effective additive formulation in Cities Service C-300 Diesel Engine Oil held sludge, carbon and varnish to the barest minimum.

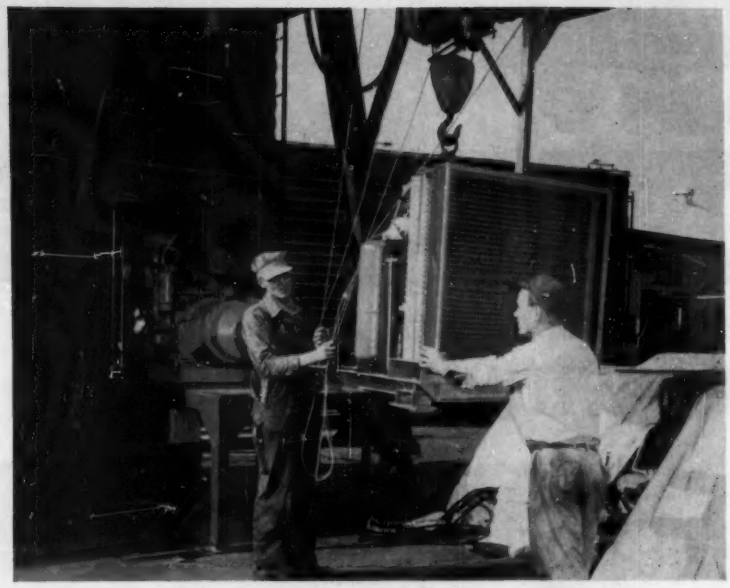
Examples of truly outstanding performance such as this are not unusual where Cities Service Lubricants and the Cities Service Lubrication Engineer have been at work. If you're not getting all the hours of work you think *your* equipment should give, call in the man from Cities Service. He'll gladly make a free lubrication survey. Contact the nearest office or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

### MAN YOU SHOULD KNOW

Lubrication Engineer James Robertson of the Cities Service office in Chicago typifies the experienced specialists who can help you solve your lubrication problems. Wherever your plant is located—anywhere east of the Rockies—there's a nearby Cities Service office and Lubrication Engineer to serve you. For the address of the nearest office, write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

## 225,000 Miles—Needs No Overhaul!

Another exceptional performance record has been set by this diesel-driven rock truck at Bradford Weston. Since 1952, it has provided constant heavy-duty service without overhaul, using Cities Service C-100 Diesel Engine Oil. Heavily fortified and highly detergent, Cities Service C-100 Oil is often used where maximum load or overload and high engine temperatures prevail. It is also excellent for intermittent-load, low temperature operation.

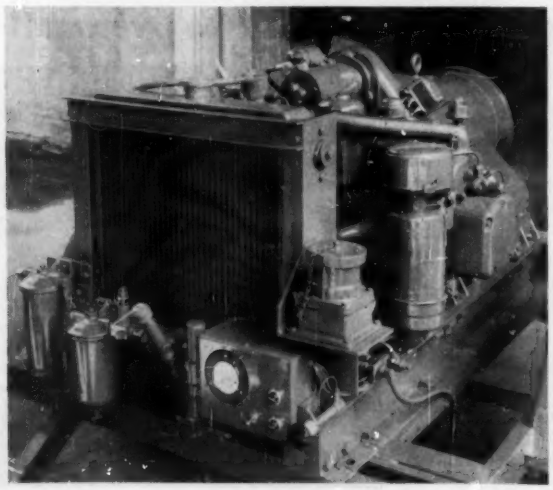


*One of the new 50-ft, 50-ton mechanical reefers is seen with GM Series 71, 2-cyl diesel-generating set installed. The 34-hp engine direct-connected to 15-kw alternator is at left. Men are installing Carrier refrigeration unit.*

# Diesel-Powered Reefers For The Long Haul

***By truck or train, refrigerated shipments are being protected by diesel reliability. Add economy and you have the reason for the trend toward use of diesels in mechanical refrigeration.***

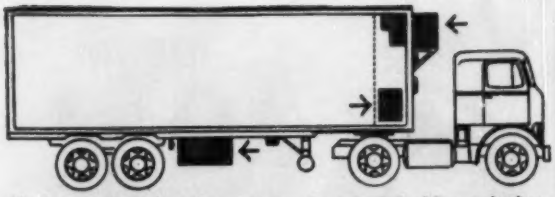
*Witte Model 100, 2-cyl, 18-hp diesel driving 12.5-kw alternator is used on the new 40-ft, 40-ton railroad mechanical reefers.*



TRUCK or reefer cars—the trend is to diesels for mechanical refrigeration. Figures prove it. More and more mechanical reefer cars and trucks are being put into operation every day. For example, one company alone, Pacific Fruit Express (PFE), jointly owned by Southern Pacific and Union Pacific, will have a 34,000 refrigerator-car fleet by February 1959 of which a growing percentage are mechanical reefers.

This is reported to be the largest refrigerator-car fleet in the nation. Of these, 1714 will be mechanical reefers when the 1000 to be added by February 1959 will have joined the fleet. Of the 1000 new cars, 500 are 50-ft, 50-ton units and the remainder 40-ft, 40-ton cars. Total cost of these units is over $20-million.

The new cars are "all-purpose" mechanical reefers. They embody new concepts in refrigeration and design and depart radically from standard models built only to haul frozen foods. They have metal flooring and sliding doors that are 6 ft wide and 8 ft high. These permit pallet loading and handling of dead freight on return trips from



*Diesel-powered refrigeration unit can be mounted either underslung, in front (outside), or in interior of truck mechanical reefer.*

the East and Mid-West. This ability to handle dead freight will increase revenues and eliminate financial burdens of costly empty westward movements.

Versatility of the refrigeration units, which allows hauling either frozen or medium-temperature perishable products, was accomplished through a modification of air-circulating equipment.

Reefers now in use feature an "envelope" design that surrounds lading space with a blanket of cold air. New cars are designed so that cold air from the evaporator is directed in controlled amounts through ceiling apertures, or diffusers directly into the lading compartment and returned through an air channel under the floor racks.

For fresh produce, constant temperatures can be maintained between 32 to 70°F. For frozen foods, temperatures can be set from 0 to −10°F. Refrigeration systems will be designed to provide humidity control. Magnetic-amplifier thermostat controls will maintain constant temperatures. Indicator lights under the running boards at the end of the car, visible only from the ground or car roof, tell whether equipment is operating satisfactorily and at the right temperature.

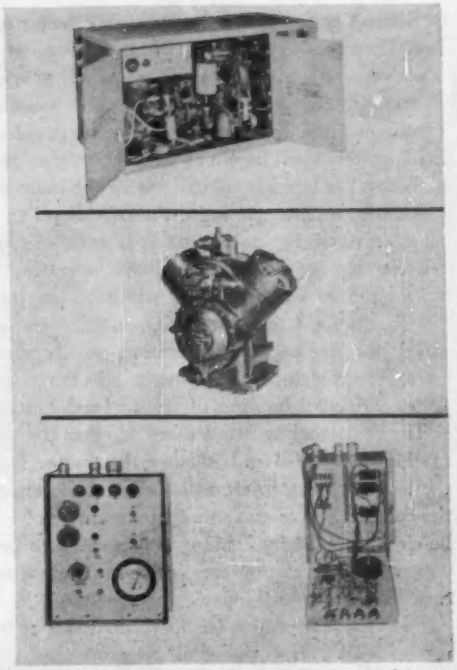
The larger mechanical reefers being built are equipped with a G.M. Series 71, 2-cyl, 2-cycle diesel powering a Carrier Corp. Model 66-E-9 refrigeration unit. The 34-hp, 1200-rpm engine is direct connected to a 15-kw externally-regulated, brushless-type alternator made by the Delco Products Div. of G.M. The Carrier unit has a 4-cyl, 10-hp semi-hermetic compressor equipped with unloaders on 3-cylinders for ease in starting and for controlled humidity.

The 500 40-ft cars are being equipped with a Witte Model 100, 4-cycle, 2-cyl, horizontally-opposed diesel. This 18-hp, 1800-rpm unit is direct connected to a 12.5-kw internally-regulated, brushless-type Electric Machinery alternator. A Trane Co. refrigeration system will be used on 300 of these 40-ft cars. A Carrier system will be used on 175, and 25 will have an Equipment Specialties Div. of Union Asbestos & Rubber Co. system.

The Trane Co. system has a 3-cyl, semi-hermetic 7½-hp compressor. The Carrier system has a 4-cyl, 10-hp semi-hermetic compressor, and Equipco, a 3-cyl, 7½-hp compressor.

Units in all 1000 cars will be installed in a machine compartment in one end of the car. The machine compartment has a sliding door for access to the equipment for servicing and repair.

After cars return from an eastbound trip they are completely inspected and a preventive maintenance schedule is followed. Refueling and checking of lube oil, radiator coolant and refrigeration system is done at the same time. Maintenance cost, per unit is estimated at $665 per year. However this will vary depending on the number of trips car is under refrigeration.



*Continental Model ZD129 diesel direct-connected to refrigeration compressor (center) makes compact unit. Control panel (bottom) is mounted in full view of truck driver.*

## Refrigerated Trucks

Railroad reefers don't handle all the fresh produce and frozen foods hauled in this country. At least 1½-million tons of frozen foods alone move to market in refrigerated trucks each year. Some 450 regulated operators of refrigerated trucks are credited with developing this business since 1945. Any product can be handled.

Several methods of mechanical refrigeration have been developed for use on straight truck bodies and on large semi-trailers. For power, these units depend on the vehicle prime movers or on an independent unit.

Refrigerating units that depend on the vehicle prime mover are generally used on straight-truck bodies only. They are small, low in cost and light in weight—but are operable only while the prime mover is running. Also, their low capacity cannot produce or maintain temperatures required for keeping foods frozen. These units merely serve as coolers for short hauls.

The same holds true for trucks having reefer units independently powered by gasoline engines. The inadequate capacity of these units reduces their usefulness to that of coolers. The sub-freezing temperatures necessary for keeping foods frozen can neither be obtained nor held. This limits the truck's maximum hauling distance. Also, accidental delays or stopovers can prove disastrous to the frozen foods.

Reliability factor for these gasoline reefer units is also low. They need a carbon cleaning about every 500 hours, a major overhaul every 1500 hours and spark plugs and distributor points replaced every 250 hours plus other continuous maintenance. Another acute problem has been inadequately-sized lube oil pans.

Today the trend is toward use of the more economical, more dependable and more durable diesel to power the truck refrigerating unit—just as is done on the railroads. Diesels can go the average 3000 operating hours per year required of these units without a major overhaul. The lightweight, compact, high-output diesels used, increase the degree of refrigeration possible and hold required temperatures indefinitely—thus making possible transcontinental hauling of frozen foods.

They can operate at all times whether the vehicle is in motion or stopped and whether the tractor is coupled to the trailer or not. Thermostats control the temperature of the conditioned space so that temperatures of −20°F may be closely maintained. Many trucks can also be heated in winter so they can automatically maintain any temperature desired by the shipper.

Transport companies are operating fleets of 500 to 1000 refrigerated trailers under all types of road and weather conditions. Some operations even involve transportation of these units on railroad flatcars and on ships and barges.

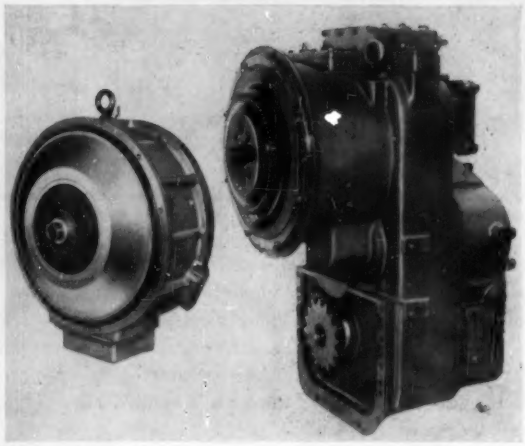
Among others, one outfit whose fleet of mechanically refrigerated trailers has already standardized on diesel-powered refrigerator units, is the Wabash Railroad Co. It uses the Continental ZD129, 4-cyl, 4-cycle, 31.3-hp, 1800-rpm, 3 1/4-in. bore, 3 7/8-in. stroke, 120-cu in. displacement diesel. This engine is direct connected to a Carrier, 2-cyl, 5-ton capacity, Freon-12 compressor.

The complete 1550-lb unit may be mounted either underslung or in the trailer. The evaporator mounts inside the trailer nose for maximum cooling efficiency. The control panel is completely waterproof and dust-proof when it is closed. It may be mounted outside the trailer for easy access. Lights indicate cooling, heating or defrosting cycles, oil pressure and generator operation. Gauges show fuel level, engine temperature and trailer interior temperature. A 3-way switch controls cargo cooling and heating. Starter, lights and manual defrost are actuated by switches.

### Conclusion

Long hauls with dependability are no longer a problem with railroad or truck mechanical reefers using the diesel. These units are economical both from the standpoint of operation and maintenance. This has helped develop the frozen food industry, making available employment for thousands. It has also helped improve America's eating habits.

Revenues for the trucking and railroad industries have naturally increased due to the large volume of business from a relatively new and rapidly growing source. This in turn has and will continue to increase the demand for the diesel units which have made the long distance dependable hauling of frozen foods possible.



## Torque Converter-Power Shift Transmission Combination For Off-Highway Heavy-Duty Equipment

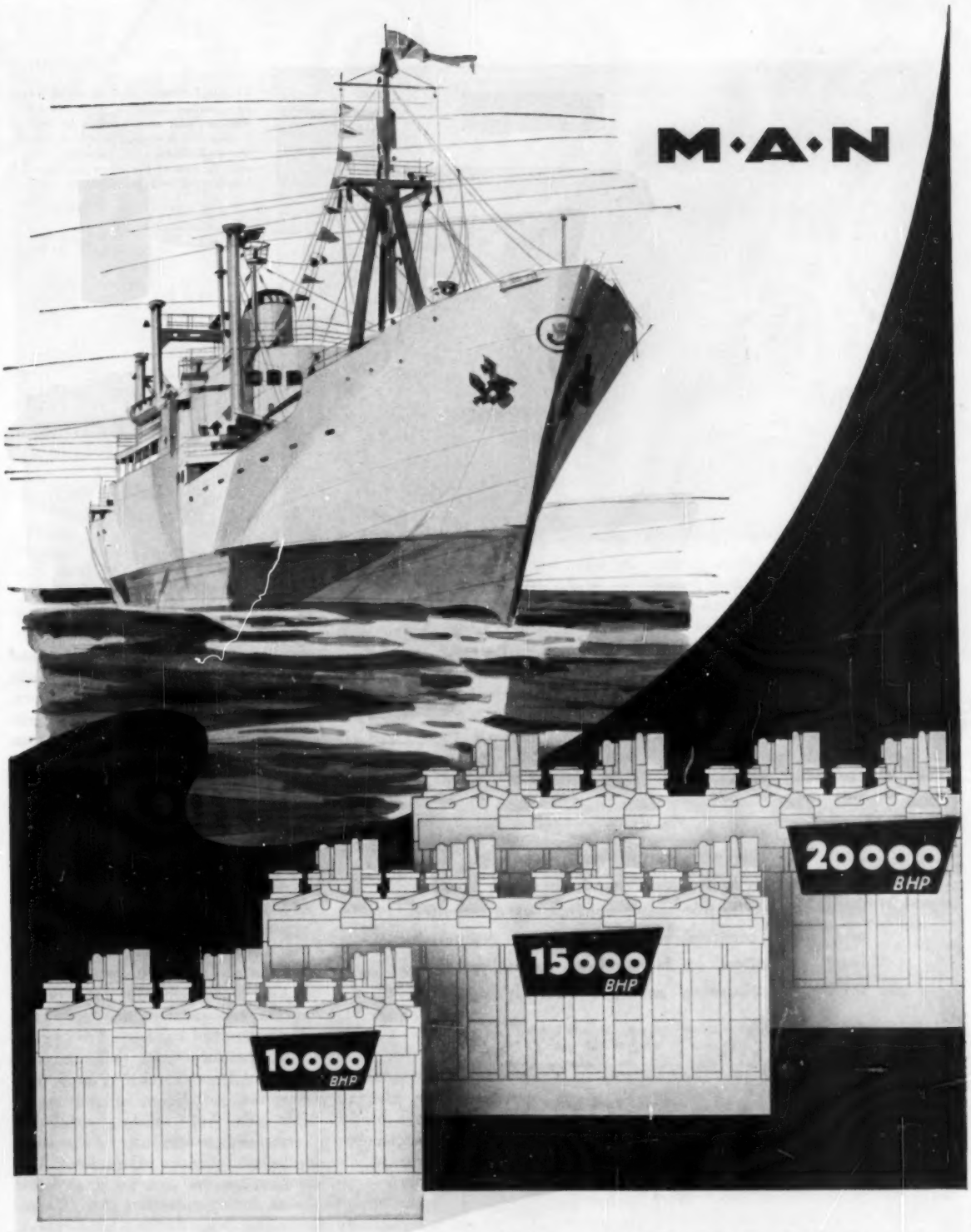
ROCKWELL-Standard Corp. now has a full line of components to both propel and carry a load. Recent acquisition of the Hydra-Drive line of hydraulic torque converters and power shift transmissions from Westinghouse Electric Corp. plus their existing line of drive-line components make this possible.

These torque converters and power shift transmissions are now made by the Transmission and Axle Div. of Rockwell-Standard. The converter can be obtained separately or combined in an integral housing with the power shift transmission. Both units meet the special needs of earthmoving, construction and materials-handling equipment.

The torque converter, with its 3-to-1 torque multiplication range, combines the advantages of a hydraulic torque converter and a fluid coupling. It provides the equivalent of a gear transmission with hundreds of ratios which automatically selects the right ratio to put maximum power to work.

The converter keeps the engine operating in its most efficient speed range (no lugging). It permits getting peak engine horsepower over a wide range of output speeds, resulting in more work in faster cycles. It also acts as a hydraulic cushion to absorb shocks in the drive line.

Hydra-Drives power shift transmissions (in integral housing with torque converter) are designed for heavy-duty equipment in off-highway work requiring multi-speed operation. They have four speeds forward and reverse. A 3-to-1 torque multiplication gives fast and effortless starting under heavy loads.




*M. A. N. Diesel Engines are built in 11 countries by 25 licensees*

TURBO-CHARGED TWO-STROKE
MARINE DIESEL ENGINES
WITH 5 TO 12 CYLINDERS

**MASCHINENFABRIK AUGSBURG-NÜRNBERG AG · WERK AUGSBURG**
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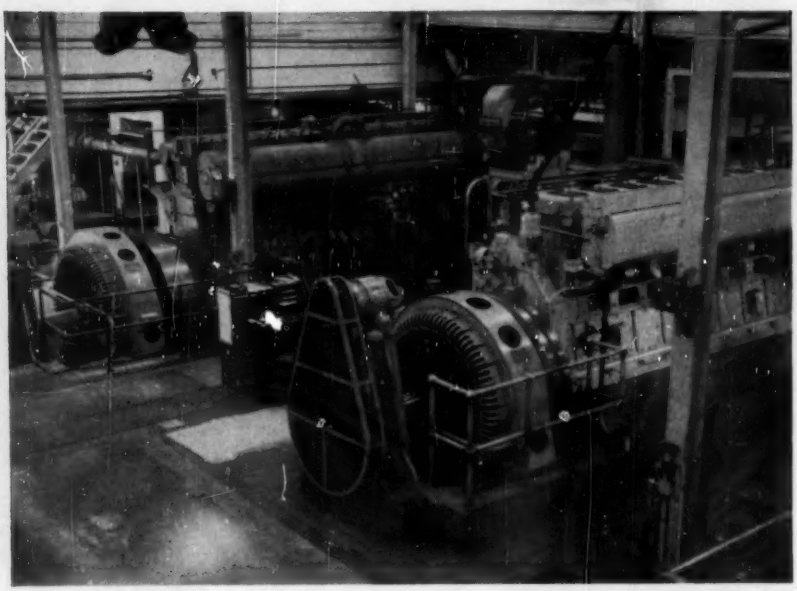
REPRESENTED ALL OVER THE WORLD



*Cooper-Bessemer JS-8 at right was first engine installed. This 700-kw, 400-rpm unit was installed in 1948. Engine No. 3 at left is a C-B, LS-8 rated 1250-kw at 327-rpm. This unit, largest of the three engines at Nantucket, was installed in 1957.*

# Nantucket Utility Goes Automatic

**By C. G. Snow**
**Vice President, Nantucket Gas and Electric Co.**

**E. R. Sauder**
**Cooper-Bessemer Corporation**

**Part 1 of this article told what was being done at Nantucket to provide dependable power at minimum cost. Why automatic controls were installed and what controls were used were discussed. Now, operation at Nantucket, including their set-up for burning residual fuel is detailed.**

## PART 2

### Automatic Operation at Nantucket

Let's see how these controls function at Nantucket. One engine is always on the line and certain systems are functioning. Engines are stopped and started on No. 2 fuel and a supply is always available at the fuel selector valve. Similarly, the continuous centrifugal re-cycle purification system for residual fuel oil will be operating.

At Nantucket, sea water is used for secondary cooling of lube oil and jacket water. An automatic pressure-controlled system assures adequate flow. Water is supplied to a header with branch lines to heat exchangers on each engine. Each branch line has an air-operated diaphram-type valve. There are three supply pumps in parallel. Pumps are automatically stopped and started as required to maintain the desired header pressure.

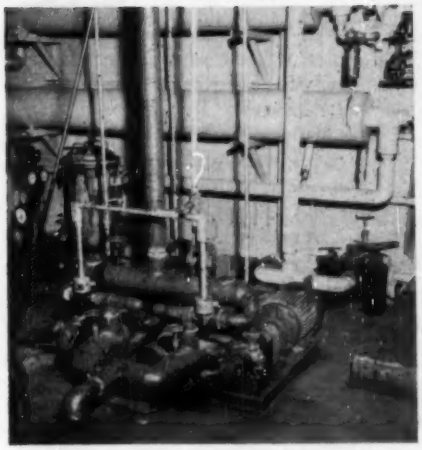
Now, assume that the Sen-s-Tron gives the signal to start another engine. The controls start the prelube pump, the circulating water pump, opens the sea water branch valve and position the fuel selector valve and other controls of this next engine in the sequence. After lapse of a preset time, air is admitted until the engine fires on No. 2 fuel. It then comes up to speed and is under governor control.

Incidentally, during this starting period, the alarm systems are cut out until normal conditions are established.

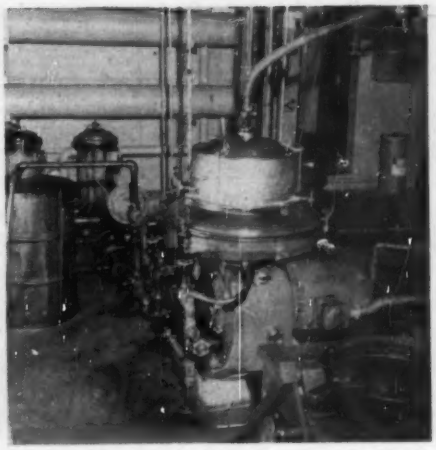
Automatically, the engine is brought to synchronous speed, synchronized and put on the line. The Sen-s-Tron unit then loads the engines according to the load demand. If total load reaches the rated output of the two engines, the Sen-s-Tron starts the third engine.

In the meantime, the engine is switched from No. 2 to No. 6 fuel. However, switchover will not occur unless the No. 6 fuel is within the prescribed temperature (viscosity) and pressure range. Also, should this temperature and pressure drop below limits during operation, auto-changeover to No. 2 fuel takes place. Changeover never interrupts engine operation whether under load or not.

When an engine is no longer needed, the Sen-s-Tron unloads the unit and then trips its circuit breaker. Automatically, change is made to No. 2 fuel for purging the injection system and in preparation for the next



*Residual fuel is steam heated by lagged heaters on wall. Supply and transfer pumps are in foreground, primary filters, left rear, strainers, right rear.*



*Re-cycle type, self-cleaning centrifuge conditions residual fuel. Fuel cleaning set-up has own alarm system that pinpoints location of failure and safeguards equipment. Example—on failure of supply pump motor, drive is shut down and oil is supplied to centrifuge bowl from overhead tank while coasting to a stop.*

start-up. When purged, the engine is shut down.

Pre-lube and jacket water pumps continue to run after shutdown to provide a cooling-down period. After this, the auxiliaries shut down and the control resets for another start.

### In Case of Trouble

Automatic operation under normal conditions has been outlined. Now, what happens in event of trouble? Various safeguards have been provided to insure that the busses will be powered at all times. Sequence controls bypass an inoperative engine and start the next one in the pre-set sequence.

It would be rare to have more than one engine down at a time. Also, systems common to all engines have been kept to a minimum. Those that are—secondary cooling and fuel supply—are backed up. If the sea water system fails, city water can be used. The dual light and heavy fuel systems are mutually supporting.

Control systems have fail-safe features. For example, malfunctioning of an engine's controls dumps the fuel injection rail pressure and the engine stops. But the controls put another engine on the line and, of course, alarms are given.

During the day shift, some supervisory or maintenance personnel may be present. When alarm is given, they can jump right on the trouble. Here's how Nantucket handles emergencies at other times. In addition to plant alarms and panel lights that pinpoint the source of trouble, a general alarm is sounded in the home of a reliable person. When alarm is given, telephone wires are burned until some competent person is alerted to get right down to the plant.

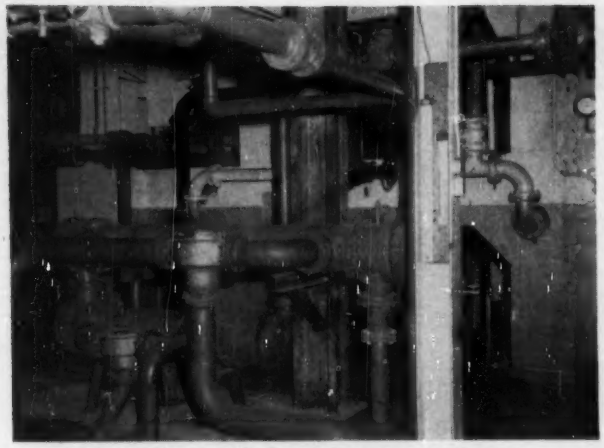
### Frequency Control

In view of their specialized load, the Nantucket plant must maintain close frequency control. In fact, specifications require that frequency be maintained within a total of 0.3-cycle variation. To do this, Cooper-Bessemer installed the latest Westinghouse electric governor, Model EFG, on engine No. 3. Two similar units are on order for the other two engines.

This governor is capable of isochronous operation with single or paralleled units and also has droop adjustment to 4% for use when operating with speed-droop governors. Speed control is independent of throttle linearity and also generator output voltage regulation. Contrasting with earlier models, this one uses only the principle of electrical speed sensing. No provision is made for load sensing. Stability is better and there is less complication.

Frequency is sensed across one phase of the generator output. Static electrical components provide a voltage output proportional to the frequency. This is compared with a constant frequency reference voltage and a variation in either direction results in an appropriate signal to the hydraulic actuator. Speed and accuracy of response has resulted in maintaining frequency control to a 0.2-cycle total variation or better.

*Pump and primary filter supplies light fuel to all engines for starting and purging of injection systems before stopping.*



*Lube oil and jacket water heat exchangers on engine No. 3. Degree of cooling is controlled by thermostatic bypass valves on primary side. Secondary sea water flow is constant when engine is in use.*

## Burning Residual Fuel

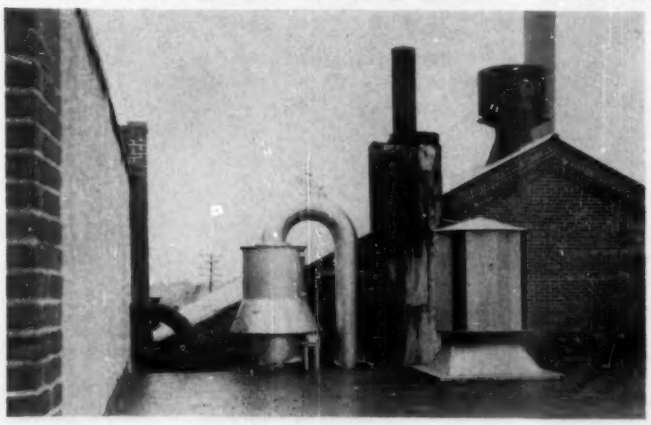
As mentioned, diesel operation started on a selected gas-enrichment oil. It was an excellent fuel and posed very few problems except the all-important one of costs. As engines were added, Cooper-Bessemer was asked to tailor the system for use of fuel with broader specifications. This was done.

It was decided to establish minimum specifications for the fuel to be purchased. Mr. Snow, vice-president of Nantucket Gas & Electric and general manager of the plant, explained that the specifications were a balance between fuel qualities that gave reasonable assurance of satisfactory operation and what fuels were available at favorable prices.

These minimum specifications are given. Mr. Snow reports that they have not been restrictive. Several bidders have offered these fuels. A slight premium is sometimes involved but the feeling is that this has been offset by a high performance level and low maintenance costs.

A diagram of the fuel system is shown. Purification of the residual fuel takes place in a self-cleaning re-cycle centrifuge system. Maintenance is practically reduced to periodic dumping of the sludge in the re-cycle system after it has been concentrated to the point that little burnable oil remains in it. Of course, the centrifuge is checked periodically but, thanks to its self-cleaning feature, only occasional bowl cleaning is needed. Filter elements are changed when their before-and-after pressure gauges register the allowable pressure drop.

*Air cleaner and silencer on No. 3 engine are typical of all three installed. Exhaust heat and salt air do silencers no good. Plant ventilator is in foreground.*



Steam from the gas plant boilers is used for heating the oil. The exception is the electric heater at each engine that controls final temperature and hence viscosity of the oil entering the engine. Fuel heating could be done with waste heat recovered from jacket water and exhaust gases but this was not considered practical at Nantucket. Load is extremely variable and steam is available from the gas plant.

Records from July 1, 1957 to June 30, 1958 give a good idea of overall plant efficiency.

| | |
|---|---|
| Kwh generated | 6,692,991 |
| Residual oil used, gal | 448,559 |
| Diesel oil used, gal | 28,130 |
| Total Oil | 476,689 |
| Btu per gal. average | 150,000 |
| Kw produced per gal | 14.04 |
| Btu per kw, average | 10,800 |

## And Finally . . . .

Nantucket Gas & Electric is convinced that automatic operation not only reduces their costs but that it provides more efficient operation. With the added savings possible through use of residual fuel, overall operation is as efficient and as low-cost as possible in a plant of this size and type.

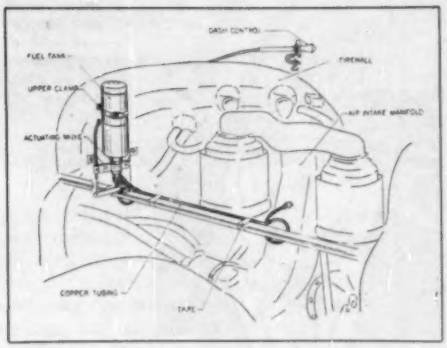
Plant reliability, if anything, is considered to be improved through never-tiring supervision of the En-Tronic control system. Included in this system is the important and unique feature of dead-buss starting, giving added protection during periods of single-engine operation. The controls provide great operational flexibility since they can be set and adjusted to meet different operating conditions and requirements.

Despite appearance that the controls were tailored for this plant, they are standard units developed and built by Cooper-Bessemer for use on their engines and are, in fact, applicable to others as well. System components have been well tried, notably in automatic pipeline pumping stations.

They have demonstrated capability of controlling gas, dual-fuel and diesel engines. Here at Nantucket they have shown ability of handling the tricky job of controlling diesels burning residual fuel—with efficiency and economy.

## Major Equipment

| | |
|---|---|
| **Engines** | |
| #1 JS8-T 750KW (1948) | Cooper Bessemer Corp. |
| #2 JS8-T 1000KW (1953) | Cooper Bessemer Corp. |
| #3 LS8-T 1250KW (1957) | Cooper Bessemer Corp. |
| Turbos—C-B on #2 and 3—Elliott on #1 | |
| **Governors** | |
| #1 | Woodward Governor Co. |
| #2 | Woodward Governor Co. |
| #3 | Westinghouse Electric Co. |
| Note: Will be all Westinghouse | |
| Injection Equipment | all Cooper-Bessemer Corp. |
| Generators & Exciters | General Electric Co. |
| Switch Gear | General Electric Co. |
| **Fuel System** | |
| #2 Fuel Pumps | George D. Roper Corp. |
| #6 Fuel Pumps | George D. Roper Corp. |
| centrifuge | Sharples Corporation |
| filters | Commercial Filters Corp. |
| Note: All filters ahead of engine are Fulflo cartridges in Cooper-Bessemer housings and labeled as "C-B Fulflo" Final filters on engine are Commercial. | |
| Fuel heaters at centrifuge | lagged, make not known |
| Heater Controls (steam heat) | Powers Regulator Company (Acritem) |
| Final heaters at engine (electric) | Edwin L. Weigand Co. |
| **Lube System** | |
| Lube oil | Sun H.D. 2340 (Series II) |
| Engine Lube Oil Pumps | Viking Pump Co. |
| Pre-lube pumps | George D. Roper Corp. |
| Coolers | Ross, Engines #1 & 2<br>Davis, Engine #3 |
| Temp. Controls | Fulton-Sylphon Div.<br>Robertshaw-Fulton Controls, Co. |
| Filters | The Hilliard Corp.<br>(Honan-Crane on #1) |
| Jacket Water coolers | Ross Engine #1 & 2<br>Davis Engine #3 |
| Circulating Pump | DeLaval Steam Turbine Co.<br>(Engine #3)<br>others unidentifiable |
| Turbo aftercoolers | Young Radiator Co. |
| **Control System** | |
| Complete system | Cooper-Bessemer Corp. |
| Scanning-type Pyrometer | (Alnor) Illinois Testing Lab., Inc. |
| Turbo exhaust Protec | (Alnor) Illinois Testing Lab., Inc. |
| Pressure Sensing Controls | Mercoid Corp.<br>Detroit Lubricator<br>Barksdale (militron)<br>(California firm) |
| Temperature Sensing Controls | Some Fulton-Sylphon<br>Fenwall, Inc.<br>Ashland, Mass. |
| Note: There is no standardization on the controls used either by function or by engine. Vibration has been a problem affecting control life and different types have been used to see which stands up. | |
| Vibration Dampers | Korfund on all three engines |




# Quick Start System For Cold Weather

WITH winter ahead—get ready for cold engine starting. One starting aid to consider is the Quick-Start system made by The Turner Brass Works. This system features one-man operation and simple, fast installation. Few parts are involved and they make a simple, compact installation adaptable to any diesel engine. This system combines the aerosol or pressurized container principle with permanent installation.

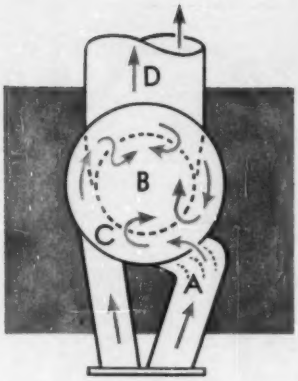
A typical Quick-Start system includes the pressurized fluid tank plus the permanently installed actuating valve, tubing to the engine manifold and control cable.

The 3-in. diameter, 9¾-in. high tank contains a compounded ether-base mixture of petroleum products. It holds enough fluid for about 240 normal starts of two-seconds duration each. It screws into the actuating valve which is permanently installed, on a vehicle's fire wall, for example. When empty, replacement is simple.

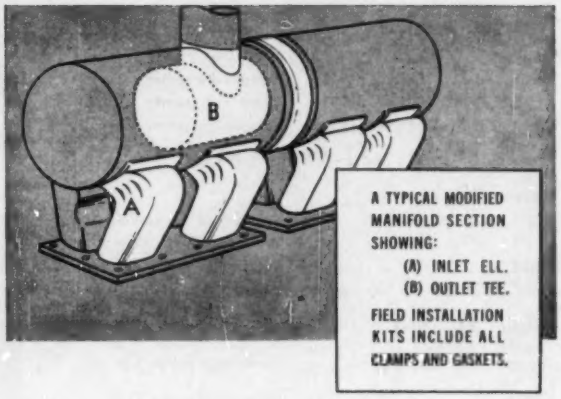
The tank can be detached at any time without fear of leakage or evaporation as it is self-sealing. This feature has its advantages. In excessively cold-weather, better atomization of the ether compound, hence improved starting results can be obtained by storing the tank at room temperature until ready for starting.

Pulling the control cable (mounted anywhere for convenience) opens the self-sealing valve in the tank. Starting fluid flows through the tubing and sprays through atomizing orifices into the air intake manifold.

When starting, the cable is pulled for one or two seconds. As soon as it is pushed in, the engine starter is engaged. If the engine falters or starts to stall, short additional shots can be injected while the engine is turning over until it continues to fire on diesel fuel.




*Principle parts of the "Spark Sentry" are: "A" curved inlet elbows connecting cylinders to exhaust manifold; "B" exhaust tee; "C" exhaust manifold; "D" stack.*




A TYPICAL MODIFIED MANIFOLD SECTION SHOWING:
(A) INLET ELL.
(B) OUTLET TEE.
FIELD INSTALLATION KITS INCLUDE ALL CLAMPS AND GASKETS.

# Spark-Arrester For Locomotive Exhausts

By C. W. Kinnear

**Fires attributed to sparks from a locomotive diesel's exhaust are eliminated with a new spark arrester being used extensively by one of the major railroads.**

SPARKS from a locomotive diesel exhaust can be dangerous. In any case, grass and brush fires attributed to these sparks can be extremely costly. All railroads operating in fire-hazard areas are faced with this problem.

Fire suppression costs passed on to railroads by local fire departments are considerable and on the increase. Even legislation requiring use of spark control equipment on the locomotive is imminent in one mid-west state. Others are likely to follow suit, unless railroads solve this problem with reasonable promptness.

One spark-arresting system specifically designed to prevent large, hot carbon particles from escaping through locomotive diesel exhaust manifolds is already in use. In this system made by the Farr Co., no screens or other devices that block exhaust flow are used.

## How It Works

Principal parts of this locomotive diesel spark arrester, called "Spark Sentry," are the curved inlet elbows "A", that connect a bank of cylinders to the exhaust manifold, and exhaust tee "B" (see illustration). The curved inlet elbows (or legs) "A" have turning or guiding vanes. These cause hot exhaust gases to spin in a uniform cyclonic manner within manifold "C", rather than causing the usual turbulent opposing flow. This cyclonic action holds the hot carbon particles to the outer perimeter of the manifold where they rotate until they burn out and disintegrate.

Function of the exhaust tee "B", is to allow only spark-free gases in the center of the manifold to be exhausted. The exhaust tube diameter is such that it prevents sparks entering stack "D". Only cleaned exhaust gases are discharged to the atmosphere. Creation of a cyclonic-type gas flow within the manifold plus careful attention to design details involving gaseous flow within the entire exhaust system, resulted in reducing cylinder back pressure substantially.

## Installation

"Spark Sentry" installation involves two simple changes in an exhaust system. Straight inlet legs on one side of the manifold are replaced by elbows with guiding vanes. Also, the manifold outlet to the stack is modified by addition of a tee that guides spark-free exhaust gases out of the manifold.

These spark arresters are available preinstalled in the exhaust manifold, including a base plate for ready mounting on the engine. They can also be obtained in kit form, including complete drawings for reworking manifold in railroad shops.

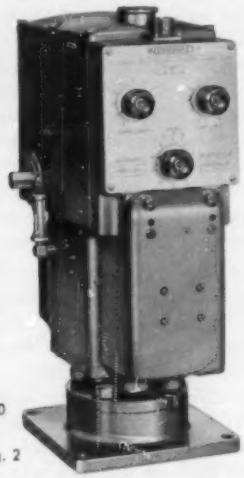
This spark control system was designed by the Standard Oil Co. of California and developed and tested cooperatively with the Southern Pacific Co. The California Research Corp., a subsidiary of Standard Oil Co., of California has licensed the Farr Co. to manufacture this device. During development of these devices, Southern Pacific RR tested about 15 types of spark arresters, including those with external and internal nettings. The "Spark Sentries" proved most satisfactory.

More than 300 Southern Pacific diesel freight units equipped with these spark arresters are now operating in fire hazard areas. This railroad's satisfaction with these protective devices has resulted in a program for extending their use to additional locomotives.

# NEW WOODWARD® TYPE LSG GOVERNORS

## Thoroughly dependable load and speed-sensing governors for the most precise engine speed control ever obtained

Fig. 1 Woodward type LSG-1 Governor



Woodward type LSG-10 Governor

Fig. 2

After years of designing, and thorough field and laboratory testing on many makes and models of diesel engines, the first two sizes of the Woodward speed and load sensing governor are now available.

Woodward type LSG speed and load sensing governors permit the smallest possible temporary change in speed that can be obtained for any given load change on a particular engine. They cause proportional division of load between paralleled units, with isochronous control. Without adjustment, system speed remains constant regardless of load on a generating plant (within its capacity, of course). Steady state speed control is excellent.

While a portion of the governor system (the load sensing) is electric, it retains all of the safety, reliability and convenience of operation that has always characterized Woodward governors. The electric load sensing helps but can't hinder. The engine is under complete speed governor control and protection at all times including starting and during emergencies, such as loss of generator excitation, single or three phase short circuits, or damage to or failure of any internal or external part of the load sensing circuitry.

If, due to accident or carelessness, electrical trouble does occur in the governing system or elsewhere, it isn't necessary to shut down the engine and send for a governor service man. The speed governor will continue to control the engine with precision and safety.

## Faster Adjustment

Operating procedures are almost the same as with conventional hydraulic governors — but simpler. In spite of this ease of operation, and limited only by engine characteristics, results are far superior to previously used hydraulic speed governors.

For smaller engines, the one foot-pound LSG-1 (Figure 1) is used. In response to a change equal to full rated load of an engine-generator set, it moves the fuel pumps to the necessary new position in about 1/100 of a second. This is so fast that on all but the highest speed two cycle engines with many cylinders, the fuel pumps are in their new position before the next cylinder is ready to receive its fuel. The ten foot-pound LSG-10 governor (Figure 2) is required for larger engines. Its transit time is about 1/40th or 1/50th of a second, repositioning fuel for full load change faster than most larger engines can be ready to receive the changed quantity of fuel. Except for a few rather unusual installations, it is the engine rather than the LSG governor that determines how closely speed can be maintained following a change in loading.

## Actual Test Results

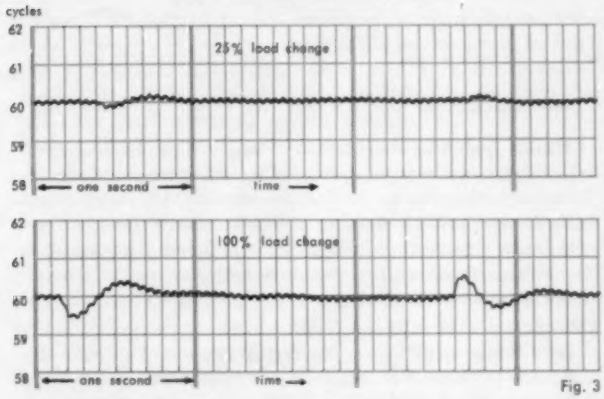



Fig. 3

Figure 3 shows the amount of speed decrease and rise measured when suddenly adding and removing resistance loads equal to 25% and 100% of rated engine load. Even with the full load change, speed is corrected in less than one second and the error is less than one cycle. Engine data: 1200 RPM, 60 KW, 220 volts, 3 phase, 6 cylinder, 2 stroke cycle, naturally aspirated, rate of acceleration 55% of rated speed per second, LSG-1 governor.

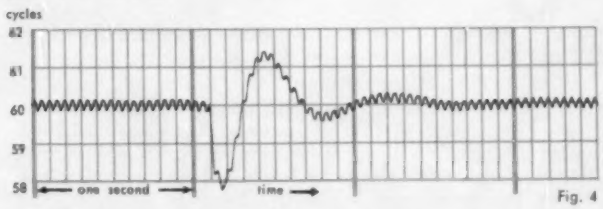



Fig. 4

Figure 4 shows the speed deviation obtained when applying a three phase short circuit on the generator.

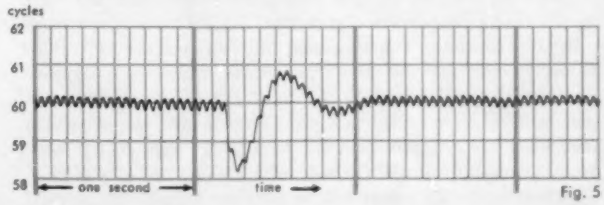



Fig. 5

Figure 5 shows the speed trace for a single phase short. Note that the speed stayed well within safe limits. There was absolutely no damage to any portion of the governing equipment.

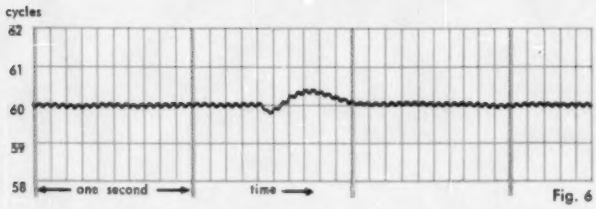


Fig. 6

Figure 6 shows engine speed and electrical conditions during starting of a 15 HP squirrel cage motor driving a dynamometer as an inertia load. The load computer circuit caused the governor to make the correct amount of change in fuel pump setting, even with low power factor and much more than rated full load generator current.

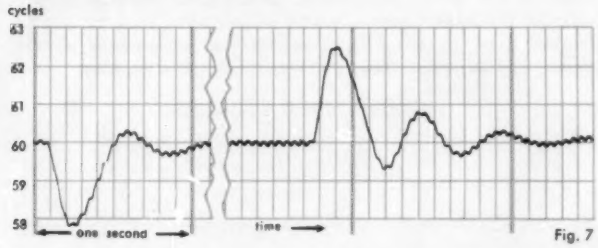


Fig. 7

Figure 7 shows a load change (resistive) of 100% on and off, with the load sensing portion of the governor out of service. Obviously, this ability to run an engine and make power regardless of possible damage to the governor's electrical system is an important reliability factor. Equally important is the safety resulting from the fact that the engine remains under good speed control in event of any kind of fault in the generator, power lines, load, etc.

On a slower speed four cycle engine, temporary speed deviations will be somewhat larger than shown unless a very large flywheel is furnished. This added inertia will keep the speed from changing so much before the next cylinder fires and produces the necessary new amount of torque. At the same time, however, this larger flywheel will increase the time that elapses before the speed returns to normal.

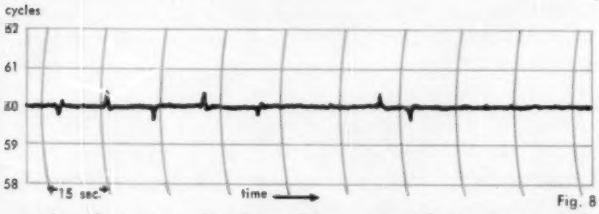


Fig. 8

Are the test results shown here accurate? Or, were speeds measured on a meter with so much damping that only a fraction of the true speed error is shown? *They are accurate.* The speed pickup on the engine was a permanent magnet type, 3 phase Bendix model 5, style A generator developing about 67 volts at 1200 RPM. The voltage developed was full wave rectified and passed through a filter with a time constant of only .017 seconds. The resultant DC was opposed by voltage from dry cells and the difference voltage applied to a Sanborn oscillograph, with response flat to 40 cycles per second. For comparison, please refer to Figure 8 made with the recording frequency meter often used for such tests. This shows transients caused by the same full load change as in Figure 3. Figure 8 looks much more spectacular but it just isn't correct! Demonstration of such rapid control as the LSG governor requires the use of precise and more rapid test equipment than has previously been required!

## How Does the LSG Work?

First of all, it includes a high quality hydraulic speed governor, a baby-size version of the thoroughly proven Woodward type PG. The output of this governor moves one end of a lever, the other end is fixed. The center of the lever is connected to the fuel pumps. So far we have a good, conventional governing system. The other end of this lever really isn't fixed, though. It is connected to an oil-operated piston which can move it very rapidly. In this half of the LSG there is also a polarized solenoid which moves a friction-free balanced oil pilot valve and simple linkage, arranged so movement of the piston re-centers the pilot valve. The result is that this load governor piston quickly and accurately takes a position proportional to the solenoid current. Now all we have to do is take signals from the potential and current transformers of the generating unit, convert them to a small direct current corresponding to watts, and apply this current to the solenoid. When generator load changes, the fuel pumps are moved rapidly to the necessary new position. All this works very well, but it isn't quite enough.

As operating conditions change, there is a slight change in the fuel pump setting required to carry any given load. This can cause a small error in speed. The speed governor portion of the LSG feels this and moves its end of the lever — and hence the fuel pump control — the small distance necessary to return speed to the correct value. Also — if the governor only brought the fuel to the correct new setting, speed would return to normal very, very slowly. The small speed deviation that does occur after a load change causes the speed governor to act in its normal manner. This causes a greater change in fuel setting than would be produced by the load governor alone and gives the engine the boost needed to accelerate or decelerate quickly to normal speed.

The hydraulic speed governor portion of the LSG serves another very useful function. When alternating current generating units are connected in parallel, all of the speed governors are set to have speed droop. The exact amount isn't important. This causes the speed governor power pistons to always remain in the same position while system frequency is normal. In other words, the speed droop causes the unit to remain at a fixed load when conditions are not changing, as with conventional hydraulic governors. Yet, in spite of this stabilizing effect of speed governors with speed droop, a change in load on the plant causes the load governor portion of each LSG to take its proportionate share of the change and the net result is zero speed droop.

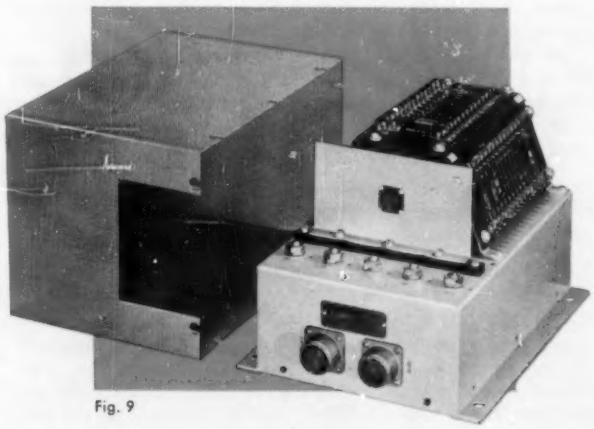


Fig. 9

We said earlier that we take a voltage and current signal (through the regular transformers) from the leads of each generator. These signals go into special transformers in our "Load Computer Box" (Figure 9) where the current signal is corrected for existing power factor and then rectified, the DC signal from the 3 phases being added together. This small DC voltage is amplified by a stable, conservatively rated, accurately calibrated, two stage transistor amplifier. The output of this amplifier goes to the coil in the governor. Where loads are always balanced, and power factor is always the same, simpler equipment is used.

Accurate load division is now obtained automatically by simple means. The inputs to all the transistor amplifiers are all connected together by the paralleling lines, so that the input voltage to each of them is the same and is an average of the DC voltages from all the transformer-rectifier circuits. Since all the transistor amplifiers are factory calibrated, the current will be the same to all the load governor coils.

Now that we're using governors with speed droop, and knowing that under varying conditions engines carry a given load at a slightly different fuel setting, how do we keep speed (or frequency) at exactly the desired value? It's easy. The output (power piston position in this case) of a governor with speed droop will take a definite position for each speed at which it runs. If it's running a little slow, its power piston will have moved some distance in the direction to increase fuel. If it runs fast, the piston will have moved in the direction to decrease fuel. The speed governor piston of the LSG operates two pairs of contacts, one if it has moved off center in the increase fuel direction and one in the decrease direction. These trimmer contacts in some one of the governors, are selected to serve for the entire generating plant by means of a master selector switch.

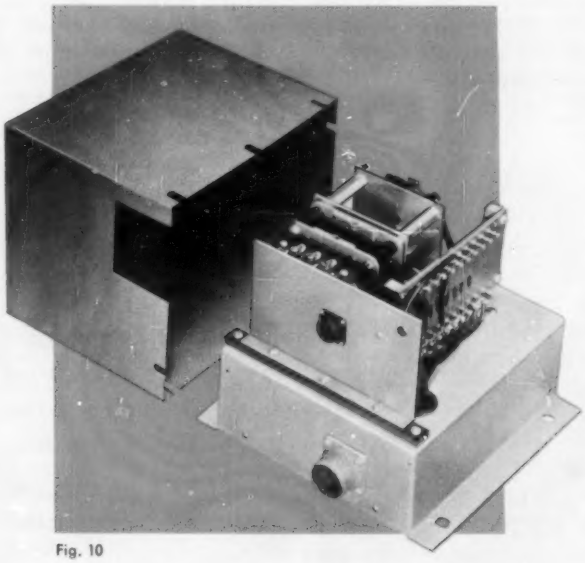


Fig. 10

If frequency isn't just exactly right after a load change, the high or low speed trimmer switch will close. This operates a very slow speed reversible motor in the trimmer assembly (Figure 10) which turns a rheostat to change slightly the current to the load governor coils of all the governors. This causes the load governor pistons to make the small fuel change needed to bring speed exactly back to normal. Return of speed to normal opens the trimmer contacts in the governor which is used as the master. Depending mostly on the engine, the speed error could be quite small, even without a trimmer.

## Operating Procedures

With conventional governors, the operator usually closes the unit circuit breaker with the synchroscope moving in the fast direction, say about 6 revolutions per minute. This machine is 6 cycles per minute or 1/10 cycle per second faster than those already running. If the governors have about 1½% speed droop (0.9 cycles out of 60), it will immediately pick up 1/9 or about 11% of its rated load. If the synschroscope is moving slower or if the governor has more speed droop, it will pick up less load when connected to the line. All operators are familiar with this. Next the operator raises the speed setting of the governor a small amount, waits several seconds, and then checks the wattmeters to see if he has picked up too much or too little load. He usually has to make one or two more adjustments and perhaps reduces load on one or more of the other units. All of this takes time, though it isn't difficult if the operator knows his business.

Things are simpler with the LSG governor. The operator synchronizes in the usual way. When the unit circuit breaker closes, the load governor circuit of the oncoming unit's governor is connected to that of the governors already in service. It immediately takes on its proportional share of the total power plant load, and the other units proportionately give up load. But — since the speed governor was set just a little bit fast, it too causes the oncoming unit to take on some extra load. Since there is no objection to using 3%, or even more, speed droop on a load sensing governor, this extra load beyond the unit's proportional share will be less than in the preceding example — say about 5%. It is desirable to lower the speed setting to get rid of this small extra load, and make the load division more exactly proportional. This is done semi-automatically with the LSG. On the switchboard panel for each generating unit there is a push button marked "Load Division Switch." It is only necessary to push this for a few seconds. It connects the speed adjustment motor of this governor to its own trimmer contacts. Since one of the other governors is serving as a master and holding correct system speed, and since the speed adjustment of the oncoming governor was a little high, its reduce speed trimmer contact will cause its motor to slowly reduce its speed setting. When movement of the speed governor piston opens this trimmer switch, the governor will be at the same speed setting as the master (and all the others) and it will have its proportional share of load. It's simple — no juggling of governor speed switches, no checking wattmeters, and no waiting. Just push the button while you count to ten.

The wiring required for one unit in a typical power plant is shown in Figure 11. This varies according to requirements of the particular plant. The current signal resistor assembly and load computer assembly (one for each generator unit) and the trimmer assembly (one for the entire power plant) may be mounted on the switchboard or at any other convenient place where there is reasonably adequate ventilation.

Load sensing cannot be used when an engine is connected to large power systems except by turning off the load sensing circuit and operating in the conventional way with the speed governor portion only.

## Many Practical Applications

There are some special arrangements already suggested, and others that will occur, for which the LSG governor will be found very helpful. Assume a power plant interconnected with one or several others. There is also a local load with frequent large load changes, for example a steel mill with a power plant capable of producing most but not all of its own power. In such a situation it is desirable to take all of the local load changes at the local plant. Until now, it has only been possible to set all the governors in such a plant to have speed droop and thus carry constant load. Load swings had to be taken from the power line. By connecting the LSG load sensing circuit to the lines supplying the local load (rather than to the leads of each generator), the fuel to the local generating units will be adjusted automatically to match all local load changes.

How about prime movers other than the diesel engines? In a four cycle gas engine there is a time lag during the intake and compression strokes and in a two cycle engine there is a lag during the compression stroke. During this time, engine speed will continue to change, even though the governor has moved the fuel control quite rapidly to the correct new position. Depending on the particular engine, there can be a great improvement because, on gas engines, this lag requires a speed governor to be set to have an excessive amount of compensation for stability and this makes it sluggish. It isn't necessary to slow down operation of the load governor.

For smaller load increases and any load decrease on a turbocharged diesel engine or a two shaft gas turbine, the LSG governor will improve performance. In many cases, however, these two prime movers can't accept a rapid increase in fuel, since there won't be sufficient air immediately available. Good results should be obtained on most steam turbines.

## Installation, Adjustment and Service

Installing an LSG governor on an engine and adjusting it requires just one added step not previously required. Compensation is adjusted in the usual way with the needle valve. On the side of the LSG-1 or on the dial panel of the LSG-10 there are marks indicating zero load and 100% (rated) load. Linkage furnished by the engine manufacturer *must* be adjusted so that under normal operating conditions the pointer will be exactly at zero when there is no load on the generator, and exactly at 100% at full rated load. This is important.

All internal adjustments in the governor, and all adjustments of the load computer assembly, current signal resistor assembly and the trimmer assembly are made in our factory. Because all parts are very conservatively rated, very little electrical maintenance may be expected. That which is required can be done without previous instruction by any thoroughly competent radio or radar technician using equipment normally available to him. We will furnish simple instructions when such service is needed.

Because it is a little more complicated than earlier governors, more care is required in overhaul, but it can be done by a competent governor mechanic. Minimum additional test facilities required are a low range and high range milliameter, a rheostat, a few dry cells and two flashlight bulbs with sockets. It is desirable to use a governor test stand rather than to test and adjust on the engine. Such test stands are now quite widely distributed and easily available.

As always, Woodward's convenient exchange plan can be used when any portion of the equipment needs service. Factory calibration makes various parts of the system interchangeable.

## Application of Load Sensing Governors To New or Existing Engines

In practically every case the application of a governor should be handled by the engine builder, who can furnish necessary mounting and connecting parts and do the necessary application engineering. Simple linkage change is needed on all engines. The LSG-1 has the same base and drive shaft dimensions as our SG and PSG governors, so no mounting change is needed when replacing these. The one foot-pound LSG-1 will not handle as large or as many fuel pumps as the more powerful SG (some SG's are one and some two foot-pounds) or the four foot-pound PSG. The ten foot-pound LSG-10 has available several mounting bases and drive shafts with dimensions the same as all of our other governors. It has sufficient work capacity to handle the control mechanism of all but the very largest engines which really do need the full power of our UG32. It is quite adequate for many of the engines now equipped with a UG32. We will have more powerful versions available in the future.

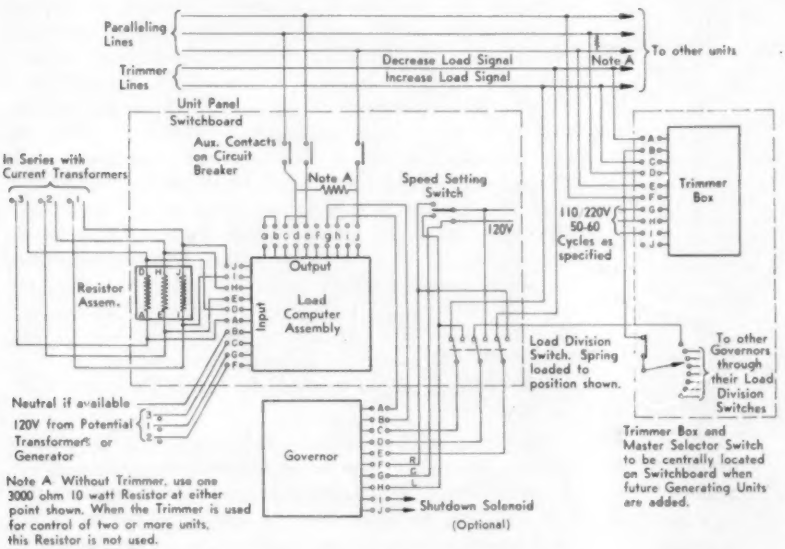

Paralleling Lines
Trimmer Lines
Decrease Load Signal
Increase Load Signal
Note A
To other units
Unit Panel Switchboard
Aux. Contacts on Circuit Breaker
In Series with Current Transformers
Note A
Speed Setting Switch
120V
110 220V 50-60 Cycles as specified
Trimmer Box
Resistor Assem.
Output
Input
Load Computer Assembly
Load Division Switch. Spring loaded to position shown.
To other Governors through their Load Division Switches
Neutral if available
120V from Potential Transformers or Generator
Governor
Shutdown Solenoid (Optional)
Trimmer Box and Master Selector Switch to be centrally located on Switchboard when future Generating Units are added.
Note A. Without Trimmer, use one 3000 ohm 10 watt Resistor at either point shown. When the Trimmer is used for control of two or more units, this Resistor is not used.

Fig. 11 Typical plant wiring diagram.

**If you have a specific application in mind, ask for an application questionnaire of engine data. After the completed questionnaire is returned to us, we can calculate expected performance on your engines.**


**WOODWARD GOVERNOR COMPANY**

ROCKFORD, ILLINOIS

Fort Collins, Colorado — Schiphol, The Netherlands



WORLD'S OLDEST AND LARGEST MANUFACTURER OF HYDRAULIC GOVERNORS EXCLUSIVELY

# Keep Customers Informed

**Product information — both for operational and maintenance data—must keep pace with product development. With this data, customers can get the most out of equipment. Keep them satisfied and they'll buy again.**

IT'S quite a jump from a 40-year-old chain-drive truck to a modern diesel-powered tractor-trailer. Yet, as revolutionary as they were in their day, the solid-tired, underpowered machines of the post-World War I era are no match for the sleek vehicles that play such an indispensable part in our modern transportation picture.

On the other hand, if we overlook the obvious disparity between the vehicle of 1919 and that of 1959, we realize that the difference between the two has come gradually and as a result of industry's constant effort to provide the best possible equipment. However, with the better performance and greater durability of today's vehicles has come component complexity. This complexity of equipment construction extends also to its operation, servicing and repair.

The same is true in the field of service literature issued by manufacturers of component parts. Primitive as early service manuals may seem by today's standards, they were the necessary forebears of modern, comprehensive service literature and training aids now needed. A company's success in making customers get the most out of equipment depends on "telling after selling." Realizing this, at least one outfit, the Fuller Mfg. Co., has gone all out in making literature available in the field. Here's what they've done through the years.

Back in 1922, when it had already been in business for 20 years, Fuller, designer and builder of diesel truck transmissions issued a 12-page "Lubrication and Operation Manual" for their truck transmissions. Including a section entitled "The Secret of Silent Gear Shifting," this booklet also touched upon the matter of transmission maintenance as follows:

"If [the transmissions] are dismantled for replacement, or other reasons, it is very important that every precaution be used in reassembling the parts correctly. All replacement of parts should be done by a competent mechanic familiar with transmission work otherwise trouble is apt to follow."

At a time when mechanics were often ex-blacksmiths forced into another trade by the trend away from horses to "packaged horsepower," it was hoped that a word to the ham-handed would be sufficient. Such was not always the case. But fortunately the early transmissions, like the machines of which they were a part, were relatively simple and a minimum of tools and training were needed to repair them.

Today's machines and transmissions permit performance undreamed of 40 years ago. To attain this performance, it has been necessary to make gear boxes more efficient—and more intricate. No longer can a converted blacksmith repair a transmission with little or no training. Factory indoctrination of mechanics has become virtually

indispensable. At the same time, component manufacturers have issued detailed manuals to instruct mechanics and drivers in the proper service and operation procedures for their products.

### Operation and Service Literature

Typical of the best of this literature is Fuller's recently-printed 100-page service manual for the Model R-1550 RoadRanger Transmission. This book, containing 348 photos and drawings, 344 more than its counterpart of 1922, is but one of many to provide owners of Fuller Transmissions with specific data on maintenance and repair of each of the popular models.

Covered in this service manual are such topics as description of the operating principles of the transmission, instructions for proper operation, specifications, lubrication and periodic maintenance recommendations, trouble shooting instructions, general and detailed disassembly and assembly instructions, and recommended inspection procedures.

Profusely illustrated, this modern service manual demonstrates graphically all phases of maintenance, operation, lubrication and repair. Step-by-step photos, accompanied by detailed instructions, cover complete servicing of each transmission.

Plus a complete range of 14 currently available service manuals are many other pieces of literature, including RoadRanger conversion manuals and cable installation instruction folders, driver instruction booklets and tags, and general literature pertaining to all Fuller models.

Among the latter are condensed specifications folders, preventive maintenance check chart, heavy-duty truck transmission maintenance booklet, lubrication recommendation folder, and literature on how to order a transmission and on the relative merits of overdrive and direct-drive transmissions. Several motion pictures designed to supplement driver instruction literature are available. These manuals, folders, and films are available to equipment owners and operators and may be obtained by requesting them through truck dealers.

### Summary

Industry has come a long way since 1922, when a mechanic could disassemble a transmission with a monkey wrench and a crowbar. Modern trucks and tractors, in fact, all power producing and transmission equipment, are immeasurably better. Together with increased performance and durability goes added complexity. Anticipating the need for more detailed procedures and instructions, Fuller is one of the many companies which provides owners, drivers and mechanics with some of the best in service literature. Perhaps this is one reason for the popularity and success of this equipment.

There is a lesson here for all manufacturers. Satisfaction with a product in the field is often roughly proportional to the degree of knowledge in proper operation and servicing.

## Additive Treatment Cuts Fuel Sludging, Reduces Costs

USERS of residual fuels can increase savings by using additives that help eliminate and prevent sludge formation. These savings can be as much as $40 for every dollar invested in the additive, according to the DuPont Co. They cite the following report as typical of the results being obtained through use of their fuel oil additive.

The DuPont plant in N.Y. State has reported that a little over $50 worth of DuPont fuel oil additive No. 2 (FOA-2) made it unnecessary to clean mechanically a 17,000-gal storage tank. Mechanical cleaning would have cost many times this amount plus the additional costs and inconvenience resulting from having the heating system out of operation during cleaning.

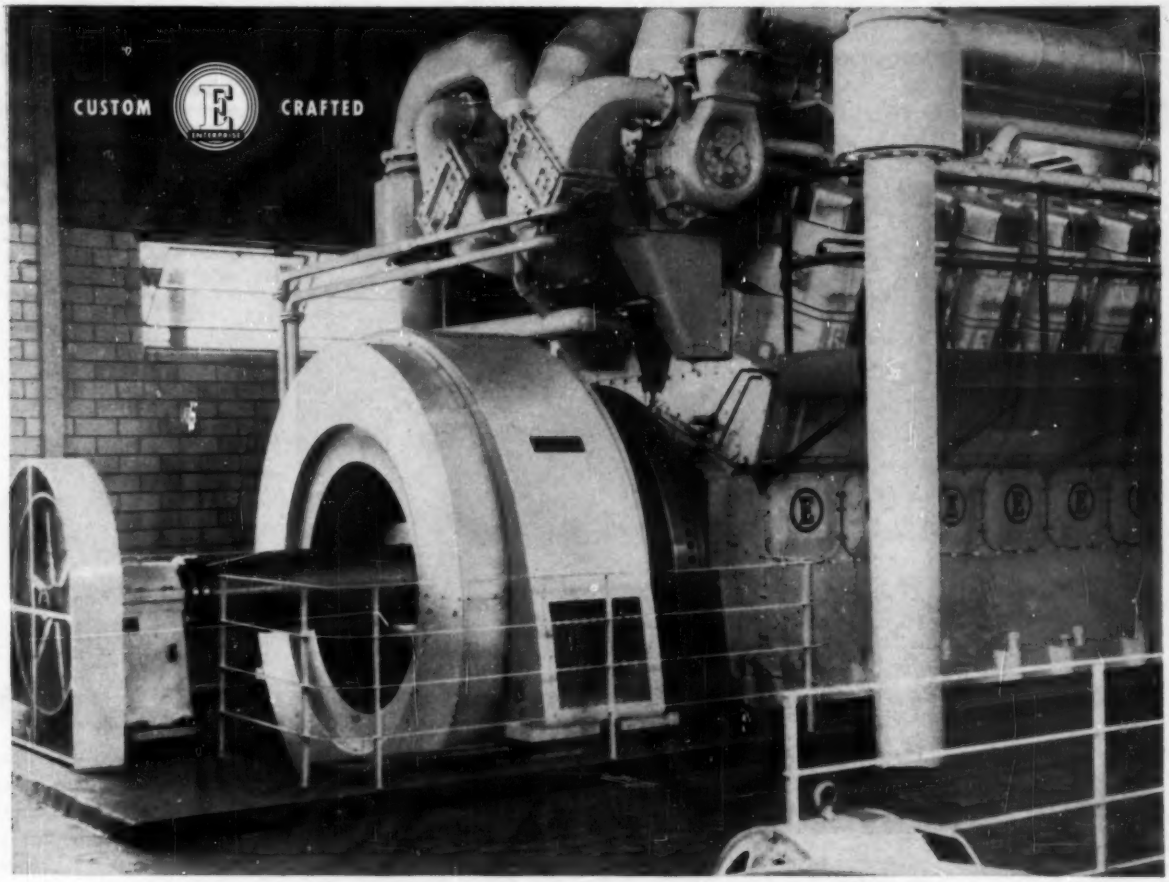
This plant uses about three million gallons of No. 6 residual fuel oil per year. Sludge in the tank was building up to several feet so rapidly that two to three cleanings per year were necessary to maintain operations. Cleaning required opening the tank and assigning a work crew to remove accumulations manually. The job was messy, time-consuming, and costly.

Last February about 80 lb of FOA-2 was added to the tank to reduce sludge formation. A few weeks later inspection showed virtually no sludge left in the tank. Since that time, addition of the additive on a once-every-four-month basis has solved the sludge formation problem. As a result, the costly clean-out operation has been eliminated.

In a similar application in another of its plants, the DuPont Co. says that $20 worth of the chemical added to a 50,000-gal residual fuel oil tank eliminated a 6-in. accumulation of sludge in one week. No equipment downtime was involved and a saving of $800 in mechanical de-sludging and cleaning costs alone resulted.

According to DuPont chemists, the additive breaks up sludge into particles so fine that they're evenly dispersed through the fuel and burned with it. The additive is non-metallic and burns without leaving ash or other residue.

Additive FOA-2 is usable in all types of distillate fuel oils, including blends. It is added to fuel oil in the storage or work tank at the rate of about 20 to 40 lb per 1000 barrels. This is equivalent to about one-half to one pint of FOA-2 per 1000 gal of heavy fuel oil.



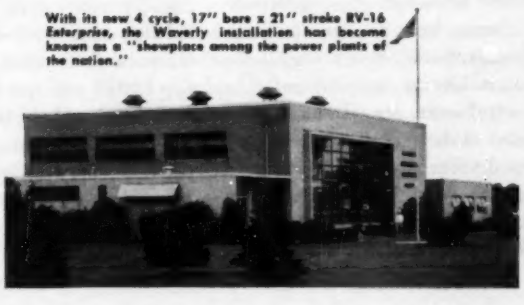

# World's Smallest Big-Horsepower Engine Now at Work for Waverly, Iowa

This Enterprise 16-cylinder Turbocharged Dual Fuel Engine is now "on the line" for the Municipal Electric Utility of Waverly, Iowa. It is the largest, most powerful engine ever built by Enterprise—yet its dimensions and weight make it the world's smallest engine in relation to its horsepower output. The Waverly engine is rated 4,890 hp—3,500 kw—at 360 rpm. Top-rated capacity of the RV: 7700 hp at 400 rpm.

Located in Waverly's West Light Plant, the Enterprise unit more than doubles the previous kw capacity of this facility, and is also generating more power than the city's East Plant with its 4 engines and 3 hydro units.

As with other custom-crafted models in the complete Enterprise line, this 110-ton engine offers many advantages which cut installation, operating and maintenance costs. Less bulk makes installation easier, servicing simpler and more economical. Maintenance requires no major disassembly because all working parts are readily accessible from the outside.

Investigate this "workhorse" source of dependable, low-cost power—the result of nearly four decades of experience, research and development. Write for Bulletin ES-B69, or ask for a representative to call.



With its new 4 cycle, 17" bore x 21" stroke RV-16 Enterprise, the Waverly installation has become known as a "showplace among the power plants of the nation."

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DEPENDABLE ENGINES

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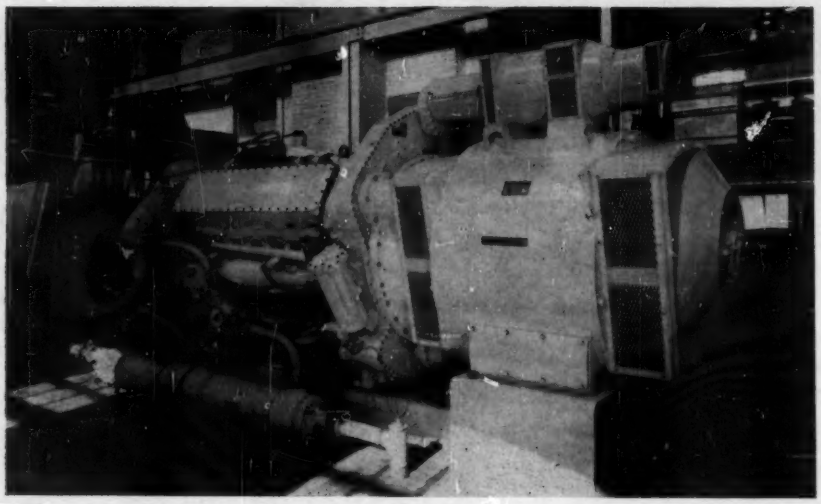


*Napier Deltic 1200-kw diesel-generator set installed at the Chelmsford, England, plant of Marconi's Wireless Telegraph Co. Ltd., is a completely pre-engineered unit. It supplies about half the plant's electrical requirements for ten hours a day.*

# Packaged Power Plants Have International Appeal

**Napier's new Deltic diesel pre-engineered, self-contained units are adaptable to permanent installations as well as portable applications.**

TODAY'S trend toward use of completely-engineered, self-contained units is also evident in England. At least one English outfit, D. Napier & Son, Ltd., has several such units in service. These include both permanent installations and portable units.

In its new Deltic pre-engineered diesel-generator set, complete with sub-base, Napier has an extremely-light-weight, high-output power plant. Their claim is that this unit is the lightest, most compact set for its output in the world.

### Permanent Installations

A prototype permanent installation that seems to prove this claim is the one supplying about half the electricity used at the Chelmsford (Essex, England) plant of Marconi's Wireless Telegraph Co. This has been the proving ground for this prototype unit designed by the English Electric Co., Ltd. and incorporating their alternator.

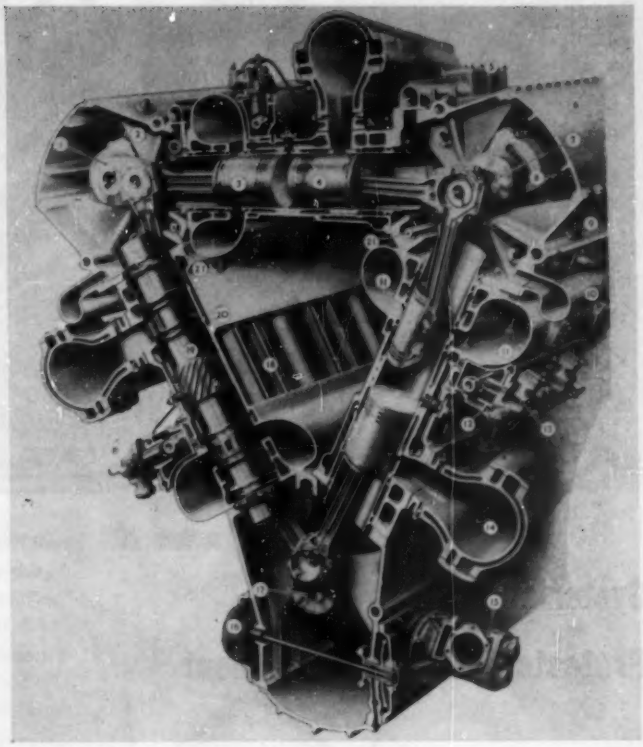
This complete 1200-kw set is only 15 ft long, 6 ft wide and 8 ft high. Its weight per kw is only 20 lb. Its 3700-v, 3-phase, 50-cycle alternator is driven by a Napier Deltic, 2-cycle, 18-cyl, opposed-piston diesel. This engine has a triangular arrangement of cylinders with a crankshaft at each apex of the triangle and two pistons working in each cylinder. Its bore is 5 1/8-in. and it has a 7 1/4-in. stroke per piston. At the 1500 rpm at which it turns the 50-cycle generator, the engine develops 1725 hp.

For 60-cycle applications, both engine and generator turn at 1800 rpm. Also, the diesel can be run at 1500 rpm and the generator at 1200 rpm. This is possible through altering of the gear arrangement in the timing gear box to give the required speed reduction for the 1200-rpm generator.

The alternator is flange-mounted to the engine. A gear-tooth coupling is used to compensate for any slight misalignment that might occur. The set and most of the auxiliary equipment are enclosed in a sound-proof booth 28 ft long, 8 ft wide and 10 ft high. This plus a specially-designed Maxim exhaust silencer cut noise to such an extent that people living in houses less than 20 yards away from the power plant have no complaints.

Power from the generator set is fed into one or all of three sub-stations through a 7-panel, metal-clad switchboard. Engine controls, a start and stop button and speed control lever, are on an engine-mounted panel and duplicated in the same way. Automatic audio and visual warning devices go into operation if any fault develops in the lube oil or cooling systems. If these alarms are not heard or observed and the trouble persists, the unit is automatically shut down.

Engine starting is by means of 450-psi compressed air.



*Nomenclature for Napier Deltic 2500-hp, 2-cycle, opposed-piston diesel. View is from driving end of the engine at a section through No. 5 cylinder. (1) "BC" crankshaft; (2) "BC" crankcase; (3) inlet piston; (4) exhaust piston; (5) crankcase breather; (6) "AB" crankcase; (7) "AB" crankshaft; (8) main bearing cap; (9) crankcase tie-bolt; (10) drain oil header; (11) air intake manifold; (12) "A" camshaft casing; (13) fuel injection pump; (14) exhaust manifold; (15) raw-water pump; (16) fresh-water pump and lube oil pump drive gear; (17) "CA" crankshaft; (18) cylinder block tie-bolts; (19) cylinder liner; (20) "C" cylinder block; (21) blower flexible drive shafts.*

This starting air is stored in two 7-cu ft bottles which are filled by a motor-driven air compressor. Starting sequence is automatic, and after starting, the engine idles at 700 rpm until brought up to speed, synchronized and placed on the line.

The generator set runs 5000 hours between piston inspections. This is equivalent to about 14 months operation at the rate of 12 hours per day, seven days per week. When inspection is due, the engine is removed within a few hours and the work is done in a properly-equipped shop.

## Portable Units

Carrying this idea of self-contained, completely-engineered units further, Napier has extended this principle to portable units. To supply main power for remote sites, standby power in locations far from public utilities, or to supplement utility power, Napier makes a complete, self-contained, portable generating set. This lightweight unit the "Deltic Compak" can be transported over any type of terrain that can be traveled by a heavy vehicle.

The Deltic Compak consists of an 18-cyl Deltic diesel flange-mounted to a 1200-kw, 50 or 60-cycle English Electric generator. This 30-ft long, 7-ft, 7-in. wide, 10-ft, 6-in. high, 25-ton unit has fuel tanks with a total capacity of 450 gallons. This is sufficient for 12 hours operation at full load.

For transportational ease, the set can be trailer mounted. Where sites have a railway spur, the unit can be mounted on a railway car. Skid-mounting is used for units hauled on low-bed trailers or carried by aircraft.

When a railway car can be used, twin 18-cyl units can be mounted on it. This twin-unit Deltic Compak has an output of 2640 kw. Overall length of this 60-ton unit is 50 ft, width is 10 ft and its height is 13 ft, 6-in. Tank capacities totaling 800 gallons make the unit capable of running at full load for 12 hours.

Removable side and roof panels make the set easily accessible for inspection and servicing. Overhauls are done in a service shop. Replacement engines can be installed in a few hours.

## Conclusion

Basically, these portable units have many features in common with the stationary generator set installed at Marconi's Wireless Telegraph Co. Ltd. Another Napier portable unit uses the same type engine to drive an air compressor designed to supply 30,000 lb of air per hour at 100 psi. Similar portable units can also be made using the Deltic diesel for driving drilling and pumping equipment. These engines are desirable in any applications where there is a limitation in both weight permissable and space available.

*Euclid TS-24 twin-diesel road scraper helps fill depression on future Interstate Highway "I-26". Euc is part of $-million worth of equipment bought by contractors for this job. Lubrication of fleet is accomplished on a completely systematized basis.*

# Systematized Lubrication Protects $-Million Investment

**A major problem facing operators with a larger number of different types of construction equipment is on-site lubrication. Here's how one contractor solved this vital problem.**

SERVICE hours—that's the key to working construction equipment at a profit. How long this equipment can operate will make you or break you. This is especially true on a big job such as taken on by the joint contractors Clement Brothers, quarry builders, and Dickerson Inc., highway builders.

Their job is to construct two adjacent segments of Highway "1-26" of the Federal Interstate Highway system. Highway "I-26" will run from Charleston, S.C. to Spartanburg, S. C. The contracts are for grading, laying a stone base, and surfacing with asphalt a stretch of the highway 20 miles long. The job involves moving 4-million cu yd of earth.

The joint contractors spent $1-million to set themselves up with new equipment to do this job. Included are, four Euclid TS-24 twin-diesel-engine scrapers and six Cat DW-21 supercharged-diesel scrapers, four Cat D-8 bulldozers, four Cat D-9 pushers, and four Cat. No. 12 motor graders.

The job of keeping this equipment running falls on Dickerson's Vice President Charles Durham. He is project manager on the job. Durham realized that the only way to keep this equipment going at a profit was to prevent breakdowns. Further he realized that the only way to do this was to set up a systematized method of maintaining the machines—especially in lubricating them.

All the new machines have different lubrication requirements. On the Euclid, oil should be changed every 100 hours while on a DW-21 every 125 hours. On the D-8 there should be 300 hours between drainings of the crankcase, on a D-9, 250 hours and on the No. 12 motor graders, 500 hours.

### Master Lubrication Chart

Durham decided to take his problem to lube oil specialists. In this case, the Gulf Oil Corp. was selected. Their Petro-Engineering Service, working with Durham and representatives from Euclid and Caterpillar, worked up a master chart. This showed how to lubricate each machine, the kind of oil or grease to use, how much oil or grease to use and how often to change it.

The Euclids' diesels are lubricated by Gulflube XHD motor oil. Gulf multi-purpose gear lube 90-140 is used for transmissions, differentials and final drives. Gulf Dieselube HD-20 is used on the Allison Torquematic torque converters. Gulflube HD-10 is used on the hydraulic system for steering. Gulf 40-10 grease is used for general bearing lubrication.

The Caterpillar diesels are lubricated by super-duty motor oil. Transmissions, differentials, final drives, hydraulic steering, and general bearings are lubricated with the same lubricants used for these components in the Euclid.

The DW-21's require super-duty oil because their engines are supercharged.

But there was more to Durham's problem than compiling this master lube chart. He still needed two things: (1) a rational method of keeping on hand supplies of eight kinds of oil and greases prescribed by Gulf, and (2) a systematic procedure to insure that each machine would be lubricated when and how specified.

(*Continued on Page* 38)

# CUT HAUL COSTS– INCREASE PROFITS

When all the facts are in, fleet owners just naturally turn to Mercedes-Benz diesels . . . Fast, over-the-road hauling is the business of these tough, smokeless, odorless world famous engines, and quality, performance and economy is the business of the fleet owner . . . With a Mercedes-Benz under the hood or riding the top as power for refrigeration, payloads hit the pay-off point . . . Their high horsepower to low weight ratio gives you an outstanding, unmatched power package.

**MERCEDES-BENZ**

**Diesel Engines**

UTICA DIVISION

**CURTISS-WRIGHT**

CORPORATION · UTICA MICHIGAN

-DAILY LUBRICATION REPORT-

Project No. 1

Date 6-14-195 8 Day of Week Saturday

| Unit No. | Type of Equipt. | Meter Reading | Oil Changed | Filter Changed | Air Filter | Greased | Gear Oil | Water Checked |
|---|---|---|---|---|---|---|---|---|
| C-10 | Cat Pusher | | | | | 6-14-58 | | |
| C-11 | " " | | | | | 6-14-58 | | |
| C-12 | " " | | | | | 6-14-58 | | |
| A-13 | " " | | | | | 6-14-58 | | |
| C-10 | Cat Dozer | | | | | 6-14-58 | | |
| A-15 | " " | | | | | 6-14-58 | | |
| B-13 | Euclid Pull. | 200 | 6-14-58 | 6-14-58 | 6-14-58 | 6-14-58 | | |
| | Rear | 178 | 6-14-58 | 6-14-58 | 6-14-58 | 6-14-58 | | |
| B-11 | Euclid Pull | | | | | | | |
| | Rear | | | | | | | |
| B-12 | Euclid Pull | 206 | 6-14-58 | 6-14-58 | 6-14-58 | 6-14-58 | | |
| | Rear | 205 | 6-14-58 | 6-14-58 | 6-14-58 | 6-14-58 | | |
| B-13 | Euclid Pull | | | | | | | |
| | Rear | | | | | | | |
| C-10 | Cat Pull | 248 | 6-14-58 | 6-14-58 | 6-14-58 | 6-14-58 | | |
| B-15 | " " | | | | | 6-14-58 | | |
| B-16 | " " | | | | | 6-14-58 | | |
| B-17 | " " | | | | | 6-14-58 | | |

***Portion of daily lubrication chart shows status of each piece of new equipment with regards to oil and filter changes, greasing, etc.***

*(Continued from Page 36)*

### Machines Serviced In Field

Gulf's detailed lube survey chart suggested the idea of an "oil dump" and a "fuel dump." Usually machines like these are fueled and lubricated right on the site. Even a half-hour delay in fueling means wage losses. To get greater efficiency out of the equipment, a new method of logistics was tried.

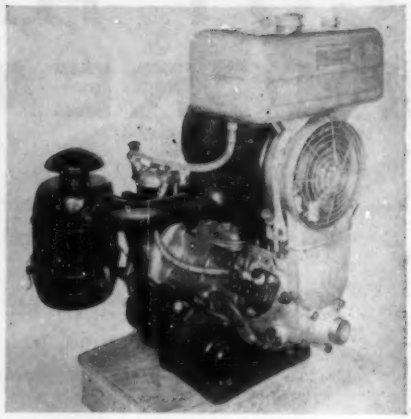
Lube oil was ordered in 55-gal drums and delivered to nearby Pomaria, where portable offices for the job are located. This oil comes in lots of 50 drums or more. A lubrication truck, which is a service truck with dispensing equipment, then draws oil from this "oil dump" and takes it to the machines needing it.

On a separate record sheet for each machine, the following data is recorded: kind of lubrication servicing performed; kind of oil used and how much; date and hour meter reading; etc. Periodically, this record sheet is compared with the Gulf master lube chart to check if specifications are being followed. Total amount of oil used is also figured from this record sheet so that more can be ordered well in advance of when needed.

Fuel oil is handled in a similar way as lube oil. Gulf diesel fuel is stored in large tanks near the project. Here again, a record is kept of how much fuel each machine uses.

Through use of this system, any overconsumption of lube or fuel oil can be spotted immediately. Gulf's Petro-engineering Service costs nothing—however, the lubrication system based on it protects a million dollar investment in new machinery.

Durham was smart to take his problems to lubrication specialists. Fortunately, most oil companies have similar consulting facilities available. Take your lubrication problems to the oil company of your choice—but by all means, consult lubrication specialists on lubrication problems.



## Hercules Markets "Jlo" Air-Cooled Diesel Line

HERCULES Motors Corp. will distribute the German-built "Jlo" line of air-cooled diesels in the U. S. In an agreement with Jlo-Werke, G.m.b.H., West German subsidiary of Rockwell Mfg. Co., they will market these engines as the "Jlo" series. The units have broad application in the industrial, agricultural and construction fields.

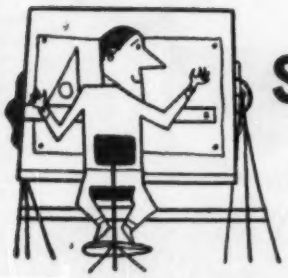
Complete service and parts for the new diesels will be maintained through Hercules' network of 76 U. S. distributors.

The units are offered in two basic models, a 7-hp, 2500-rpm, and a 12-hp, 2000-rpm unit. These 1-cyl, 2-cycle diesels feature a cast aluminum cylinder block, crankcase and piston. The engines weigh 110 and 190 lb respectively.

Other major features of the new line are: simplicity, through use of air intake through crankcase; reverse-loop scavenging system; a Lanova combustion system; good back-up torque characteristics; and an axial blower for proper cooling under all loads.

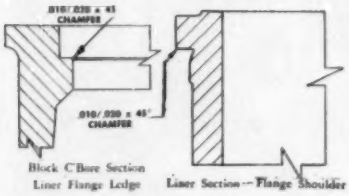
The smaller model, the Jlo-325, has a 2.75-in. bore, 3.35-in. stroke and 20-cu in. displacement. It is 13¼-in. long, 14-in. wide and 14.7 in. high above the crankshaft. The Series "Jlo-660," measures 18¾-in. long, 25⅛-in. wide and 17⅝-in. high above the crankshaft and has a 3.55-in. bore, 4.1-in. stroke and 40-cu. in. displacement. See photo above.

Standard equipment furnished with the Jlo-325 include air cleaner (dry type), governor, muffler (mounted on side of cylinder), flywheel for standard clutch, flywheel housing, starting crank, and lube oil pump. The same accessories are furnished with the model Jlo-660 except that an oil-bath air cleaner is used and a fuel filter is included.



# service section

**Recent engine and equipment modifications, procedures and recommendations straight from the different manufacturers to you**




### Cummins Liner and Block Chamfer

Cylinder liner flanges and counterbore ledges in cylinder blocks of all current production 4⅞-in. and 5⅛-in. bore engines are being chamfered on the leading edges to prevent interference and reduce possibility of liner cracking.

It is recommended that you chamfer the edge of the cylinder block liner flange ledge whenever you reface the liner counterbore in the block. Do not chamfer deeper than 0.020-in. because it will reduce the liner seating area.

Always check liner seating with a very light coat of Prussian Blue on the liner flange and counterbore. A good liner seat should be indicated next to the liner wall and not on the outer flange rim.

All H and NH cylinder blocks and liners used in engines after serial No. 136500 have these improvements.

### Transmissions In Cat DW20 and DW21 Modified

New, coarse pitch bevel gears and pinions are now used in the transmissions of Caterpillar DW20 and DW21 tractors. The coarse pitch gears have fewer but larger teeth, and provide greater gear tooth strength while retaining approximately the same gear ratio.

The former bevel gear and pinion are still furnished for parts replacement in earlier tractors. However, if desired, the coarse pitch gears can be installed. Consult the Cat Dealer Service Department for installation advice.

### Save on Alco Fuel Pump Plunger And Barrel Replacements

Here is money saving information on replacements for Alco Model 244 engine fuel pump plunger and barrel assemblies. Reconditioned assemblies cost 35% less than new ones. Pumps with these reconditioned units can be calibrated to the same values, as with new assemblies.

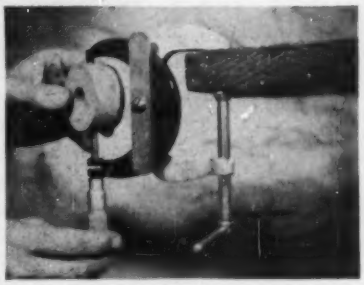
Before returning worn plunger and barrel assemblies to Alco, make sure that: (1) plunger flange is stamped "219" (2) barrel is free of rust and cracks, and (3) lapped end surface of barrel is free of corrosion and pitting. Pack worn assemblies carefuly to protect them from rust or damage.

This salvage procedure uses a new plunger fitted to the old barrel and provides an assembly with the same metallurgical composition and tolerances as the original.

### Rain Water Can Damage Battery

Use of rain water in a battery may not be safe according to F. P. Plovick, Field Service Mgr. for Delco-Remy Div., G.M. Rain water falling through heavy smog or air masses contaminated with metallic dusts may absorb mineral impurities injurious to the battery. Likewise rain water can cause battery damage if it has been collected from galvanized or zinc-coated eaves, troughs or metal containers where it is likely to have absorbed metallic traces.

However, in smog-free areas rain water collected directly in a glass, plastic or earthenware container is one of the safest things you can put in a battery.



### Micrometer Holders

A. R. Tanner of Poughkeepsie, N. Y. had developed a "third hand" for himself. This "third hand" is a holding device for outside micrometers and other precision instruments. Use of this holding device (as shown) leaves the hands free to hold and measure an item easily and accurately.

The holding device consists of a 4-in. wide-throat C-clamp and a 6-in. long, ⅛-in. x 1-in. flat steel bar held to the clamp with a ¼-in. x 2-in. bolt and wing nut. A ¼-in. hole is drilled through the center of the C-clamp throat and through the bar to accommodate the bolt.

The micrometer is placed between the C-clamp and the bar and held in position (see illustration) by tightening the wing nut. The C-clamp can then be fastened to any object which does not interfere with the measuring procedure.

### Torque For G.M. "71" Engine Water Pump Gear Retaining Nut

When rebuilding Series 71 raw water pumps, caution should be taken to apply specified torque for the retaining nut that secures drive gear to the pump drive shaft. This retaining nut should be torqued to a maximum of 25 to 30 ft lb. Excess of recommended torque could result in a shaft fracture and early pump failure.

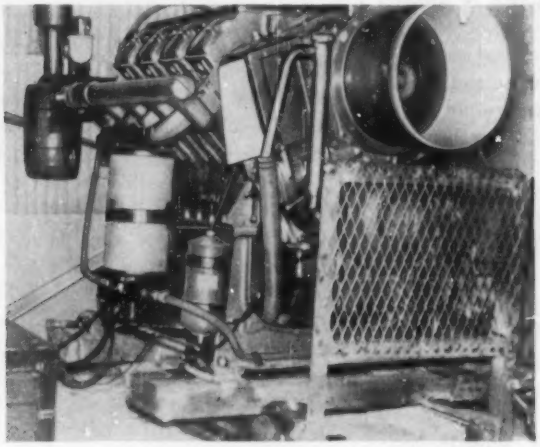
# industry news

### GM Diesel Hydrostarter Performs At −25°F

The GM diesel hydraulic starter has proved successful in sub-zero tests held in GM's cold-test labs. It was used to start a diesel at −25°F without the aid of external heat. The engine's response to the starter is said to have been almost instantaneous with firing impulses generally occurring within 6/10 second.

The starter was mounted on a 2-cyl GM diesel-generator set. Similar starting tests were performed at the same time on a 290-hp GM 6-cyl Series 110 engine.

Before the official tests, both engine and starter were exposed to sub-zero temperatures a week. Thermocouples were used to measure lube oil and coolant temperatures to further determine complete −25°F soaking of the engine prior to each start.



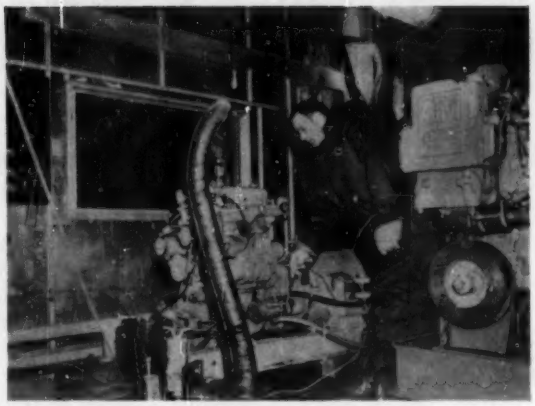
### Diesels Save Construction Co. Money On Big Jobs

Many companies are sharing in the work to complete the $625-million Niagara Power Project. One of these is Spina, Inc., of Niagara Falls, N. Y. This Company generally does home building, stone removal, blacktopping and general contract work.

On the Niagara Power Project, Spina, Inc. does subcontract work for Merritt-Chapman & Scott and Gull-Defelice. In homes relocation work on the Project, Spina moved 200,000 yards of dirt in a six-week period, using eight Cummins diesel-powered trucks.

In 1954 the company turned to diesel power for more economical operation. Arthur Spina, president, now reports fuel costs have been cut 40% and maintenance costs 70% as compared with the gasoline units previously used.

The Company has four Mack B42 tractors repowered by Cummins JT-6-B Turbodiesel engines and 10 Mack B-83's powered by Cummins NH-220 engines.

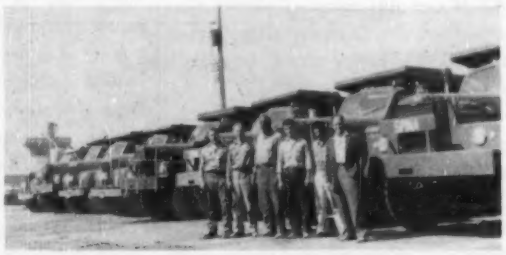


### Diesels Cut Cost Of Oil Recovery

This Deutz Model A8L 614 air-cooled diesel is being used to pump 7000 barrels of water daily into a well at Eureka, Kan., for crude oil recovery. The pump used for this water flooding operation was originally driven by a 100-hp electric motor. Use of the 100-hp, 1500-rpm, V-8 Deutz diesel burning crude oil recovered from the well has resulted in considerable savings for the Wood Oil Co.

Where well head gas is not available as fuel, the crude oil-burning diesels have proven very economical. This is particularly true in secondary recovery operations such as water flooding. Here, the injection pumps are driven directly by these diesels as they are also on the producing wells.

Where motor-driven pumps are still used, they too can be powered by crude-burning diesel-generators.

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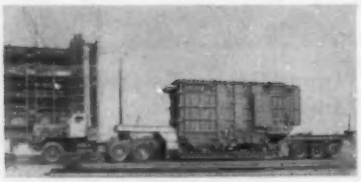

### Mighty Mack Pulls Record Load

A new heavy-hauling record was believed established by the Gerosa Haulage Corp., of New York, when it moved by motor truck, this giant electric transformer weighing as much as 100 average size automobiles. Hauling experts believe this is the largest load ever moved by this type of motor vehicle.

The huge Mack tractor used to pull the load, weighs 23 tons, stands 12 ft high and is powered by a 425-hp diesel. The low-bed trailer on which the transformer is resting is said to be the largest of its type ever built in America. Over-all length of the complete rig is about 67 ft, 3-in.

### Hydraulic Fan Drive Effective

Engine cooling fans in the Kenworth trucks built for Pacific Intermountain Express have a unique and efficient drive. These replace former mechanical and electrical drives. Two problems were effectively solved.

Engines in these trucks are under the cab and several feet behind the radiator. There is a cross member in-between. Conventional belt drive was out. Besides, with such drives, power is wasted since full fan capacity is needed only for a small percentage of the time. Electrical drives would work but meant beefing up the truck's electrical system.

With the present hydraulic system, a balanced-vane pump, belt-driven from the engine provides fluid power which drives a hydraulic motor with the fan mounted on its shaft. Fan speed and thus cooling capacity is closely controlled by adjustment of a relief valve. This makes it possible to match cooling capacity to the engine's cooling requirements under varying operating conditions.

Hydraulic equipment was made by Denison Engineering Division, American Brake Shoe Company.


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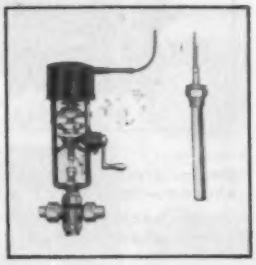

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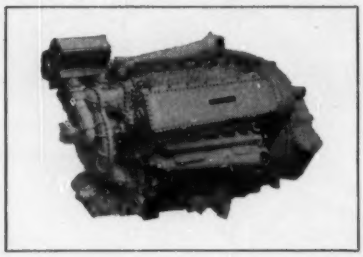

Napier Deltic 18-cyl. opposed piston, 2-stroke diesel marine power unit.

Deltics—Napier-engineered, high speed diesels—reduce shore-to-rig crew transportation times by 50% and more.

Deltics pack a bigger punch into a smaller space than any other marine engine—they are 25% the size of conventional diesel units.

Deltics can cruise a 50-passenger launch at 35 m.p.h. with a comfortable reserve of power in hand.

For fast, reliable, low-maintenance marine transportation, Deltics—9 or 18 cylinders—can be integrated into your design calculations. For more information contact **NAPIER ENGINES INC.**, 909 Dupont Circle Building, Washington 6, D.C. Telephone: North 7-0146.

The boat illustrated is one of the fleet of Thornycroft-built, twin Deltic powered, 50-passenger crew launches operated by the Shell Petroleum Company on Lake Maracaibo. Plans of Deltic powered crew boats suitable for Gulf operation are available.

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## industry news

### Wyman-Gordon Celebrates 75th Anniversary

Speeches by Major General W. O. Senter, Director Procurement & Production, Air Material Command and Sinclair Weeks, former Secretary of Commerce, highlighted the 75th anniversary celebration of the founding of the Wyman-Gordon Co. This Worcester, Mass., company, founded in 1883, is one of the leading manufacturers of forgings in the world.

They have developed from making small parts for looms and bicycles to making parts for engines, railroad cars, autos, planes, jet aircraft and guided missiles. Their 50,000-ton forging press gives an idea of the work size that can be handled by this company.

### Yellow Transit Expands Diesel Fleet

Fifteen new Kenworth cab-beside-engine tractors have been added to the fleet of Yellow Transit Freight Lines of Kansas City, Mo. The tractors, powered by Cummins JT-6-B Turbodiesels, join 302 similar units in service for Yellow Transit. The company operates 727 road trailers and 591 city delivery units.

Repurchase of Kenworths with Cummins diesels was made to keep operations standardized and because of the economies of diesel power. The 302 units in service have 325,000 to 350,000 miles per unit and have averaged 6.4 mpg of diesel fuel.

Yellow Transit serves a 9-state area with rapid relay service from San Antonio, Texas to Chicago, Detroit and Cleveland and other industrial centers. The company has 36 terminals in Missouri, Illinois, Kansas, Indiana, Kentucky, Michigan, Ohio, Oklahoma and Texas.

### DEMA Election

At the recent annual meeting of the Diesel Engine Manufacturers Association, the following directors were elected for 1959.

The new president is John N. MacKendrick of Clark Bros. Co.; The new vice presidents are William E. Butts

of General Metals Corp. and Eugene L. Miller of The Cooper-Bessemer Corp. Robert H. Morse, Jr. of Fairbanks, Morse & Co., is the new treasurer and Robert L. Stanley is executive-secretary.

These men are the new directors: William F. Burrows of The White Motor Co.; Guy J. Coffey of Chicago Pneumatic Tool Co.; M. C. Davison of Ingersoll-Rand Co.; Otto H. Fischer of The Union Diesel Engine Co.; Robert E. Friend of Nordberg Mfg. Co.; Thomas E. Hughes of Cleveland Diesel Engine Div., GM; William F. Boyle of the Hamilton Div. of B-L-H; and E. J. Schwanhausser of Worthington Corp.

### SAE 1959 National Meetings

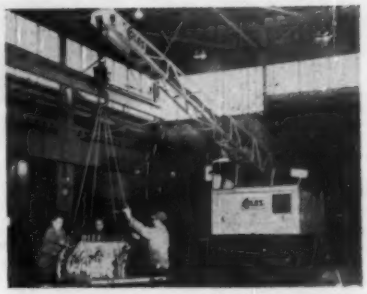
The Society of Automotive Engineers National meetings in 1959 which are of the greatest interest to the diesel engineering field are: The Annual Meeting and Engineering Display to be held on January 12-16, at The Sheraton-Cadillac and Hotel Statler, Detroit, Mich.; The Summer Meeting to be held on June 14-19, 1959 at Chalfonte-Haddon Hall, Atlantic City, N.J.; The National Farm, Construction and Industrial Machinery Meeting, Production Forum, and Display to be held on September 14-17, 1959, at Milwaukee Auditorium, Milwaukee, Wis., The National Transportation Meeting to be held on October 26-28, 1959 at the La Salle Hotel, Chicago, Ill.; The National Diesel Engine Meeting to be held on October 27-28, 1959 also at the La Salle Hotel and the National Fuels and Lubricants Meeting to be held on October 28-30, 1959 at the La Salle Hotel.

### Self-Propelled Crane

The Philadelphia Electric Co. was faced with unloading turbine and generator components from trucks and trailers and stockpiling miscellaneous materials in yards. This involved moving through doorways, into and out of buildings and inside the buildings themselves.

Plant engineers decided on the use of a diesel-powered self-propelled crane, equipped with a cantilever-type boom, to provide the flexibility needed in going in and out of doorways and meeting yard requirements. In this instance a Coles S-810 Crane is used. It is full-circle slewing one-man operating crane.

It is equipped with a Hercules DD-226 diesel engine. The engine drives a generator, which in turn, provides power for separate motors controlling the various crane actions. The engine is one of the Hercules line of interchangeable models which, with but few modifications, can be used with diesel or gasoline fuel.

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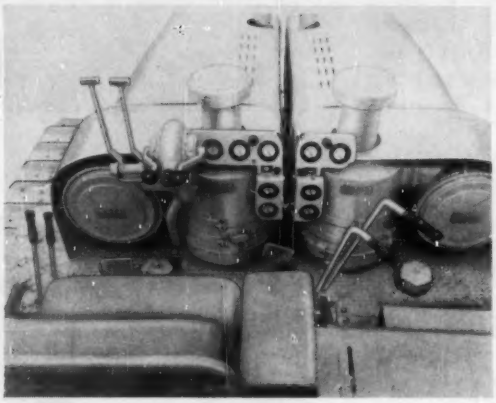
# new products



### Dry-Type Air Cleaners In Euclid Crawler

Current production models of the new series Euclid TC-12 tractor are equipped with two Donaldson dry-type air cleaners—one for each engine. These new cleaners are said to be 99.9% efficient and easy to service.

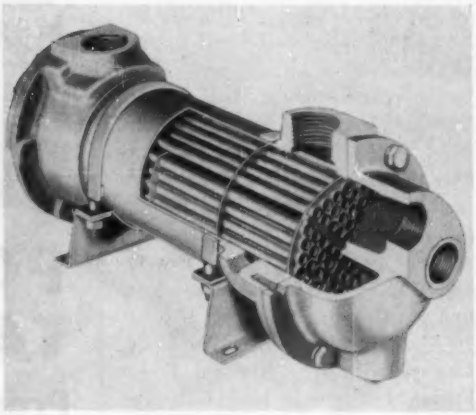
The primary cleaner has a removable dust cup that can be emptied and cleaned quickly. A special paper element in the secondary cleaner has long service life. It is reported to be easily cleaned by compressed air or washing and is then reused.

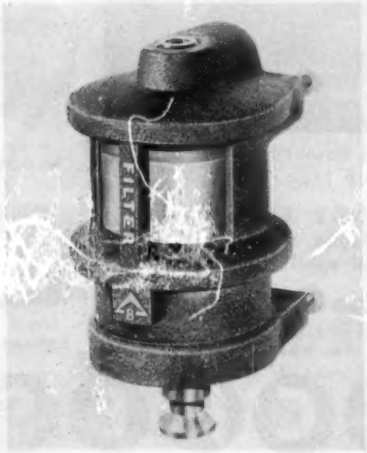
Field tests of this new cleaner on many types and makes of heavy equipment indicate that its high efficiency can result in better engine performance and lower maintenance cost. On the Model TC-12 both cleaners are in a very accessible location as shown.

### New Perfex Heat Exchanger Line

The Perfex Corp. of Milwaukee, Wis., manufacturer of heat transfer equipment since 1911, has developed a complete line of standard stock heat exchangers. They are known as Perfexchangers. The units have an improved type of shell-and-tube heat exchanger in sizes from 1.3 to 200 sq ft of surface.

The Perfexchanger design prevents bypass around the tube bundle thus increasing efficiency 10 to 15%. Optimum clearance between tubes, shell, and baffles, plus more efficient tube spacing, further increases efficiency. An added feature is the universal mounting bracket, which is detachable and rotatable 360°. Perfexchangers are available in single-, 2- and 4-pass models in a complete range of sizes to meet a wide variety of applications.





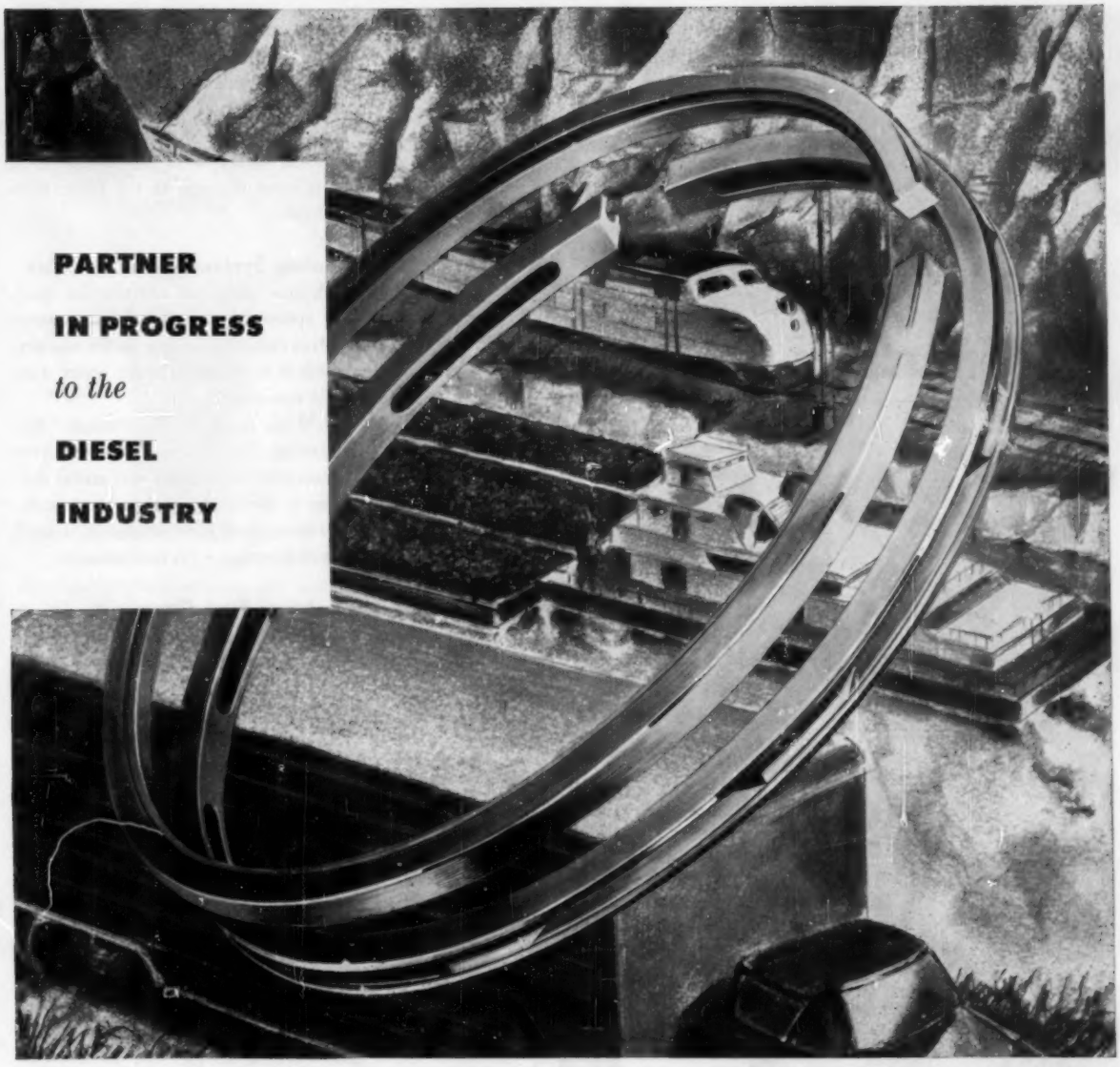

### Indicator Shows When Air Filter Needs Servicing

A mechanically-operated indicator developed by Bacharach Industrial Instrument Co. automatically shows when an air filter needs servicing. The unit has four ranges: 15-in. of water, (for light duty use such as on diesel farm tractor engines); 25-in. of water, (this is the most widely applicable type); 40-in. water, (for filters on heavy-duty diesels); and 10-in. of mercury, for specific applications.

This 1 5/8-in. diameter, 2 5/8-in. high indicator can be used with wet and dry filters. It is provided with lugs for easy mounting at the filter or any other convenient location. It is connected by tubing to the clean air side of the filter. As dirt gathers in the filter and air flow resistance increases, a red warning signal "Change Filter" rises gradually in the indicator window.

When dirt has gathered to the extent that the filter needs servicing, the warning signal locks in full view. After filter is serviced, warning signal is returned to its low position by depressing the indicator's reset button.

(*Continued on Page 46*)



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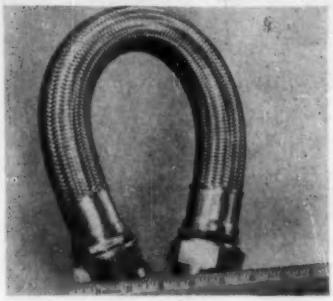
**PERFECT CIRCLE PISTON RINGS**

## new products

(*Continued from Page 44*)



### Finger-Flexible Industrial Hose

Springfield "400" Teflon finger-flexible hose assemblies for high-temperature (65° to 400°F) and corrosion-resistant industrial applications have been developed by Titeflex, Inc., Springfield, Mass.

These lightweight hose assemblies are reported to have a long life expectancy. Good flow characteristics are indicated because of low convolutions found in the inner tube.

Hose assemblies are available in diameters from ¾ to 2-in. and have a minimum bend radius of 3-1/3 times the equivalent tube size. If bent below minimum bend radius, hose flattens out but is said to return to original shape with no evidence of permanent damage to the inner tube or braid.

### Cooling System Water Additive

A new chemical additive for cooling systems and industrial and automotive radiators is now on the market, which is reported to make water non-scale forming.

KM-25, made by Kool-Master Engineering Co., Odessa, Texas, forms a monomolecular film over metal surfaces to eliminate and prevent scale, corrosion, and electrolysis. It is said to not interfere with heat transfer.

### Electrical Fuel Gauge

An electrical fuel gauge which recently appeared on certain new tractor models is now being marketed by Rochester Mfg. Co., Rochester, N. Y.

In addition to tractors, this voltage-compensated gauge can be used on buses, trucks, saddle tanks for trailer trucks or other vehicles. Underwriter-approved pressure types are available for LP-gas tractors. It is available for 6 and 12-v systems.

### Lift Truck For Rough Terrain, High Lifting

Big materials handling is an expanding market for diesel engines. One example is the new 6000-lb-capacity Lull (LD-600) fork lift truck for operating over rough terrain and handling high lift operations. It is made by the Lull Engineering Co.

It is powered by a 6-cyl Hercules Model DD-298 diesel developing 85 hp at 2000 rpm. It has a full reversing shuttle transmission. The new truck also features four-wheel drive, power steering, power booster brakes and tilting telescopic tower.

### Columbia Synchronous Generators Ratings Increased

The Columbia Electric Mfg. Co. Cleveland, now offers its new Frame 5200 series synchronous generators at ratings up to 1000-kw, 900 rpm, 60 cycles in all standard voltages

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Canadian Distributors:
Joseph Lucas (Canada) Ltd., Head Office: 11 Davies Avenue, Toronto 8, Ontario
Branch Office: 3401 St. Antoine Street, Montreal 30, Quebec
*A.P. 817*

through 6600-v. Fifty-cycle units are also available.

These generators can be supplied for engine drive, either as two-ball bearing units or single-bearing with straight shaft or forged flanged shaft as required. They have direct-connected or top-mounted belt-drive exciters.

### Lubrication Alarm System

A protective device for use on force-feed lubricating systems can now be obtained from Manzel, a division of Houdaille Industries, Inc., of Buffalo, N. Y. It is a low-cost method of providing positive protection for valuable engines, compressors and other machinery.

The "Lube-Line Alert," is installed at each terminal point of lubrication by simply cutting the line and connecting the fittings. It is then connected electrically to any desired audio, visual or mechanical warning device. If lubricant flow fails, the unit can operate the warning device or a relay to shut down the engine.

### Electrical Safety System

Mak-Saf, an automatic electrical safety system for trucks, buses, marine and industrial equipment, is now being produced by Rochester Mfg. Co. It is marketed through Safety Enterprises, Inc., New York City. Mak-Saf switch eliminates short circuit fire hazards difficult to detect until damage is done.

Electrically operated through a pushbutton control in the driver's compartment, the battery can be disconnected instantly in case of circuit trouble. Equipped with a solenoid valve in the fuel line, the fuel supply can be cut off.

Should a vehicle tip more than 60 deg, the battery is automatically disconnected and fuel supply shut off.

(*Continued on Page* 51)


NUGENT

offers something *Unique* in strainers

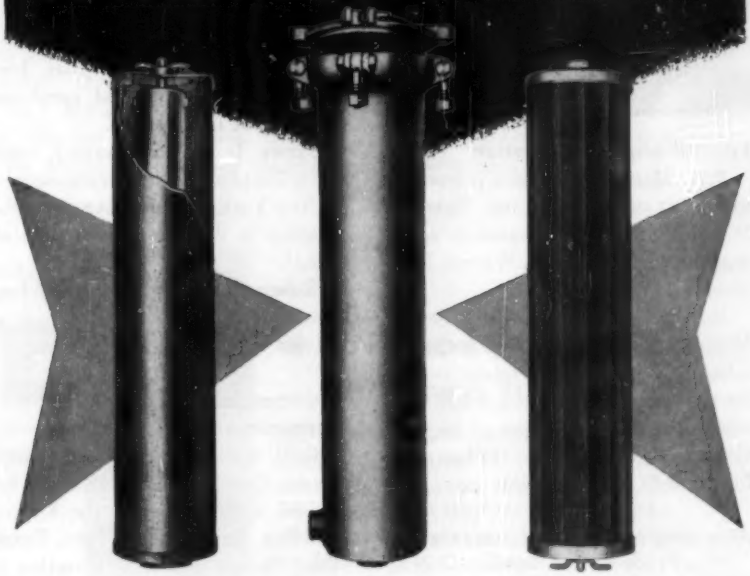


Figure 1554A-4L strainer basket available in brass, steel or stainless steel screen. 8 x 8 to 100 x 100 mesh.

Figure 1554-4L and Figure 1490DD-4L strainer shells are identical. Strainer baskets shown are interchangeable in this model.

Figure 1490CN-4L basket. Star-shape provides 20% more free screen area in this size. Available same metals, mesh as Fig. 1554A.

Nugent pipe line strainers can materially reduce your maintenance labor costs and hold down-time to a minimum. Unlike most strainers of this type, both the Nugent round basket and star-shaped extended area strainers, shown above, catch and hold their accumulation of foreign solids in the interior of the strainer basket.

Dirty liquid, under pressure, enters the strainer through the bottom inlet. It is then propelled upward through the center tube assembly. Emerging at the top, the liquid travels outward and downward, through the mesh of the basket and to the side outlet. In this manner, foreign solids are trapped *inside* the strainer basket which is then easily lifted from the outer shell for cleaning. A clean spare basket may be immediately substituted and the dirty basket cleaned when convenient.

Most other strainers direct the flow of dirty liquid from the exterior to the interior of the basket. Thus, foreign matter is trapped between the outer shell and the basket; not inside. When these dirty baskets are removed for cleaning, it is almost impossible to prevent some foreign matter from flowing back to the inlet and outlet piping. This type also requires scraping and cleaning the interior of the outer shell, a time consuming task that increases down-time.

Nugent strainers can save you time and money. For full details write for Bulletin 6.

ESTABLISHED 1897

WM. W. NUGENT & CO., INC.

3426 CLEVELAND STREET, SKOKIE, ILLINOIS

REPRESENTATIVES IN PRINCIPAL CITIES

OIL FILTERS • STRAINERS • TELESCOPIC OILERS
OILING AND FILTERING SYSTEMS • OILING DEVICES
SIGHT FEED VALVES • FLOW INDICATORS

# people and plants

T. J. Marshall

### Federal-Mogul Promotion

T. J. Marshall has been promoted to sales manager of the Federal-Mogul Div. Formerly assistant sales mgr. he succeeds K. W. Warren who resigned.

Marshall has been with Federal-Mogul since 1930. He was assistant sales mgr. in 1946. In recent years, he has had direct responsibility for sales supervision of many of the Division's largest accounts. He has also functioned as advertising manager.

### Alco Makes Two Assignments

Alco Products, Inc. has announced two new assignments to its West Coast sales and service operations and a new appointment to its New York area sales staff.

T. E. Fryar, former assistant renewal parts manager at the company's Los Angeles warehouse, has been named renewal parts and warehouse manager at Los Angeles.

James L. Layton, former transportation products sales representative in New York, has taken over a similar position in the Los Angeles sales office.

Robert G. Koob has succeeded Layton in New York from his post as service manager in the district.

### Commercial Filter Corp. Representatives

G. M. Wallace & Co., representatives for the Commercial Filters Corp. has opened a new office in the Electric Building, Suite 512, El Paso, Texas. The office is under the direction of Mr. B. M. Huffman.

SAFE
DEPENDABLE GENERATOR OPERATION
Spark Free!
EXPLOSION RESISTANT
KATO
Adaptable To Any Industrial Engine!
Kato's complete line of 50, 60 and 400 cycle revolving field AC Generators is now available in brushless design.
Especially desirable for operation in gaseous environments.
KATO BRUSHLESS AC GENERATORS
60 CYCLE SIZES
2 Phase: 5-400 KW
1 Phase: 5-150 KW
SPEEDS
720, 900, 1200, 1800 RPM.
Take your choice throughout the Kato Line—Brushless or standard slip ring types. For all your 400 cycle or power converting needs investigate Kato's complete line of high frequency alternators and motor generator sets. Complete control systems for all Kato products include Kato magnetic amplifier voltage regulators, static exciters and motor starters for synchronous or induction motors.
BUILDERS OF FINE ROTATING ELECTRICAL MACHINERY SINCE 1928
NEW BRUSHLESS GENERATOR CATALOG
Write For It Today!
KATO
ENGINEERING COMPANY
1400 FIRST AVENUE, MANKATO, MINNESOTA — PHONE 8-2941

R. Gunter

G. Bransom

### AiResearch News

R. Gunter and G. Bransom have been promoted to the positions of assistant division manager and sales manager, respectively of the Garrett Corp., AiResearch Industrial Div.

Gunter joined the AiResearch Mfg. Div. in 1943, and transferred to the Industrial Div. in 1954 as chief accountant.

Bransom came into the Garrett organization with the AiResearch Mfg. Div. of Arizona in 1955. He was transferred to AiResearch Industrial in August of this year.

The J. T. Jenkins Co. of Los Angeles has been named distributor for AiResearch turbocharger kits.

Sales, service and installation of AiResearch Model T1419 turbocharger kits on Cummins NH series diesels will be handled by Jenkins through Washington, Oregon, California, Arizona, New Mexico, Texas, Utah, Nevada, Idaho, Montana, Colorado and Wyoming.

### Elliott Co. Appointments

E. F. Downey has been appointed district manager of Elliott Company's Charlotte office. He came to Elliott in June 1952 and after completing his apprentice course, he was assigned to the Crocker-Wheeler application engineering department. In October 1954, he went to the Charlotte, district office as field engineer.

A. P. Grimm is now manager of Elliott Company's Milwaukee district office. He joined Elliott in June 1951 as field engineer in the Philadelphia office. He was assigned to the Wilmington sub-district office in 1952.

W. J. Lyons is now manager of Elliott Company's Newark district office. Since May 1954, he has been manager of the Charlotte district office.

### Rogers Industrial Locomotives

Rogers Brothers Corp. of Albion, Penna., has announced its facilities for the designing and building of locomotives for all industrial uses. This has been done after three years of development by their locomotive design engineers during which time many units have been delivered.

Efforts at present will be devoted largely to custom designing and manufacture of diesel-hydraulic and diesel-electric locomotives in 5-ton to 40-ton sizes and track gauges from 21-in. to 56½-in.

Each diesel-hydraulic locomotive has a powerful high-torque diesel engine, an efficient torque converter and a power-shift transmission which makes manual shifting unnecessary.

### Cooper-Bessemer Subsidiary Renamed

Cooper-Bessemer's recent acquisition, the Creole Engineering Corp., a wholly-owned manufacturing and engineering subsidiary in Houston, Tex., has changed its name to C-B Southern, Inc.

C-B Southern's initial engineering and manufacturing will concentrate on completely-packaged, pre-piped gas engine compressor units of the type widely marketed by C-B but formerly packaged by other companies. Other compressor products of particular significance to the areas served by C-B Southern will follow.

### Air-Maze Sales Representatives

McMurry & Co. of Miami and H. L. McMurry & Co. of Jacksonville, Florida, are now sales representatives for The Air-Maze Corp.

In their new association with Air-Maze, they will handle application and sales of air and liquid filters for engines and compressors.

### Oakite Appoints Marketing V-P

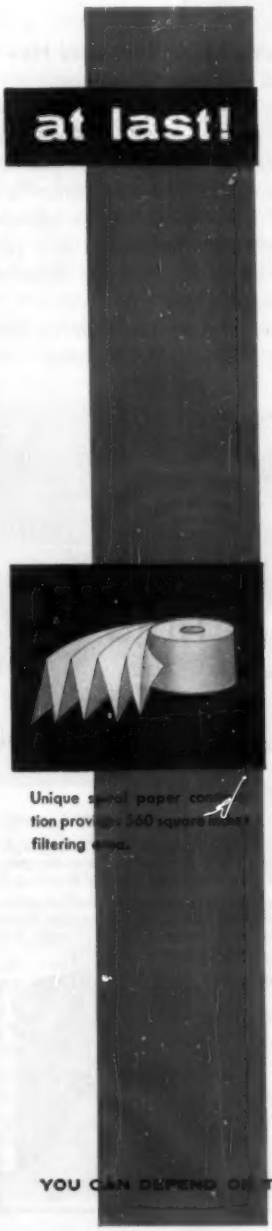
J. Basch has been appointed to the position of marketing vice president of Oakite Products, Inc. He was formerly vice president for research and product development. He will be responsible for sales, engineering, advertising, and marketing research as well.

### American Bosch Appointments

R. M. Whelan is now assistant manager—service sales of American Bosch Div., American Bosch Arma Corp. He joined American Bosch in 1950 as a sales representative. In 1953 he was appointed service sales representative for the Minnesota, Wisconsin and North and South Dakota territory.

B. J. McCormick has been appointed manager of the Detroit Regional Sales Office. He has been associated with American Bosch since 1940. He was with the Production Planning Dept. and later became assistant production mgr. In 1950 he was transferred to the Sales Dept. and assigned as a field engineer to the Detroit Office where he has been assistant mgr. since 1956.

Louis Nagy has been appointed staff assistant to Bertram L. Cole, General sales mgr. He comes to American Bosch from the Communications & Electronics, Inc.


**a low cost, small size large area filter**

Solve your installation problem with just one ROOSA MASTER fuel filter assembly with paper element filter. Only 6" high, 3½" in diameter, it takes less space on your engine. No tools required, no fuel lines to disconnect and only 1" clearance needed when changing element . . . and it costs less than throw-away filter assemblies. Write for information.

HMS ROOSA MASTER — makes good diesels better

HARTFORD MACHINE SCREW CO., HARTFORD 2, CONN.
*DIVISION OF STANDARD SCREW COMPANY*

Member

YOU CAN DEPEND ON THE DIESEL THAT DEPENDS ON ROOSA MASTER

## people and plants

Clark L. Hastings

### Clark L. Hastings Elected President of Rochester Mfg. Co.

Clark L. Hastings has been elected president of the 43-year old Rochester Mfg. Co. He moved up to the position from vice president in charge of sales and advertising. He succeeds Allen H. Ottman, who resigned last April to become head of the Forbes and Wagner firm of Silver Creek.

### New Wm. W. Nugent Representative

The L. A. Christopher Co., 1715 York Street, Denver, Colo., has been appointed a representative of Wm. W. Nugent & Co. (Inc.) for New Mexico, Colorado, Wyoming and Montana. They will carry a complete line of Nugent filters.

### Enterprise Promotions

Dale W. Blanton has been promoted to assistant sales manager of the Enterprise Engine & Machinery Co., a subsidiary of General Metals Corp. Robert A. Thompson has been made manager of contract engineering.

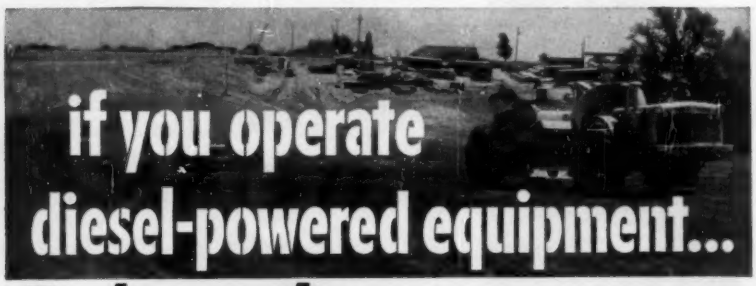
Mr. Blanton has been with Enterprise eight years. Before his promotion he was manager of contract engineering and prior to that he was employed by the Atlas Engine Co.

Mr. Thompson, a 20-year man with Enterprise, was formerly senior contract engineer in the diesel engine sales department.

### American Marc, Inc. Gets New VP and General Sales Mgr.

W. D. Brumback is the new vice president and general sales manager at American Marc, Inc. Brumback, long associated with manufacture and sales of internal combustion engines, will guide the international sales program for the firm's full line of diesels and generator sets.

He joined American Marc in April 1958 as director of OEM sales.


**Tachographs help cut down "lugging"**

**...lengthen engine life...save fuel!**

The RPM Tachograph is a recording tachometer which gives your operators a constant guide for proper engine operation, flashes a warning light when predetermined control speed is exceeded, and provides supervisors with an accurate charted record to check operator performance. In addition to engine speed in RPM, the Tachograph chart records time, total engine revolutions, and OFF periods.

A small investment in an RPM Tachograph for every diesel engine you operate can pay big dividends by reducing costly "lugging."

Tachographs are easy to mount and position on the instrument panel, are ruggedly built and tamper-proof. Bulletin SU-107 tells the whole story—mail the coupon today.

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Name and Position_____
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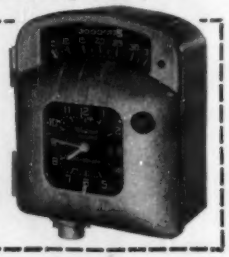
Address_____
City_____ State_____
We operate_____ (NUMBER) Vehicles



H. Chessin

L. Alderuccio

### Van Der Horst Appointments

Dr. Hyman Chessin is now director of research and development for the Van Der Horst Corp. He has been assistant director of research since 1954.

Named to assume the post of assistant director of research and development is Lee Alderuccio. He first joined the Corporation in 1954 as a research electrochemist.

### Curtiss-Wright Places Emphasis on Construction Equipment

Curtiss-Wright has started an aggressive marketing program which includes the expansion of the established distributor sales and service organization for their new line of construction equipment. Full scale entry into the construction equipment field by Curtiss-Wright through its South Bend Div. marks another major step in the broad program of diversification of the company.

Self-propelled and tractor-drawn scrapers from 7 cu yd to 30 cu yd and rear dump models up to 35 tons capacity are now offered.

Robert Campello is now general sales manager and Edward McCartney, product sales manager for construction equipment.

### Piston Products, Inc., Exclusive Daros Rings and Liners Distributor

Piston Products, Inc., Skokie, Ill., is now the exclusive distributors of the well-known Daros piston rings and liners throughout the U.S. They have a substantial quantity of these rings in stock and additional sizes are in transit or in process.

### Exide Industrial Branch Moves

The Boston branch of Exide Industrial Div., The Electric Storage Battery Co., has moved into a new building at 315 Mystic Ave., in suburban Medford, Mass. The branch, with its service station-warehouse, serves the New England states.

## new products

(*Continued from Page 47*)

### Time Counter

Since many types of machinery are serviced and overhauled on a time basis, the Deuta elasped time counter can be of great use. It tells the exact time that production machines as well as vehicles of all kinds have operated. It can be either electrically operated or mechanically driven.

Counting range of the instrument is 99,999 hours with a minimum reading of one minute. The instrument is easily mounted and gives a clear reading. Setting back of the timer is impossible according to EPIC, Inc., sole U. S. distributor.

### Magnetic Inspection Equipment

Peterson Machine Tool, Inc. of Merriam, Kan. has developed an advanced line of magnetic particle inspection equipment and supplies. These Sonoflux units for detection of cracks and flaws can be obtained in a wide variety of both portable and booth-type magnetic particle inspection machines.

The machines are particularly suitable for automotive machine shops and engine rebuilders for inspecting heads, blocks, crankshafts, camshafts, conrods, etc., to locate cracks and other defects not visible to the naked eye.

### Permatex Cold Parts Cleaner

A new cold parts cleaner made by Permatex Co., Inc., is said to cut cleaning efforts of mechanics almost 60% by dissolving and washing away hardened foreign coatings from engine parts.

This immersion-type, water-sealed cleaner, is marketed in 6-gal containers holding four gallons of liquid. The cleaner is supplied in two differently labeled containers—one with a reuseable, sturdy, steel basket with handle, legs and perforated bottom and one container without the basket.

Parts to be cleaned are placed in the basket and the basket immersed in the cleaner. The highly concentrated blend of solvents under the water seal does the rest. The water seal prevents evaporation of the cleaning compound and also acts as a rinsing agent.

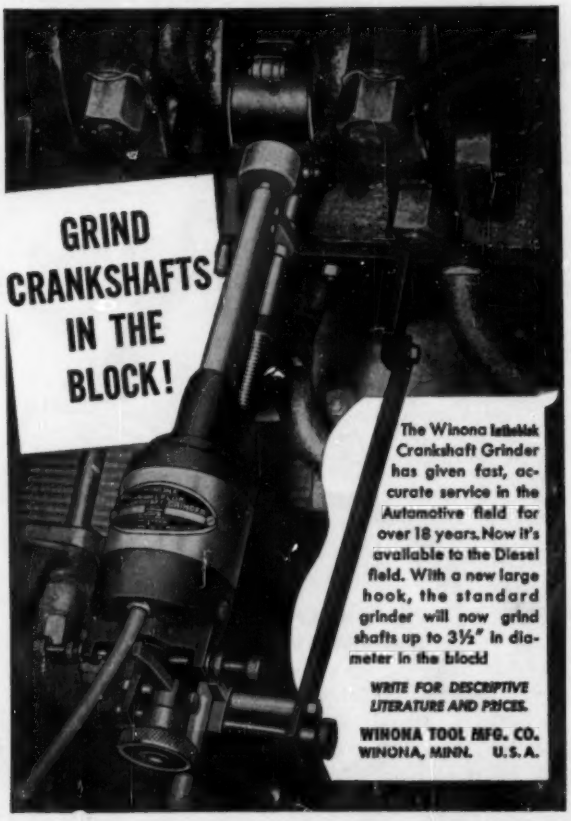
### Improved Starting Fluid Offers Advantages

"SureFire Motor Starting Fluid" is now available in 11 oz. pressurized cans and pint cans. This new improved formula is said to offer a low ether content-starting fluid which gives diesel engines fast starts without excessive detonation down to 65°F below zero.

It is also reported to contain a built-in "Polar Molecular" corrosion inhibitor and high grade lubricant, which protects against corrosion in the upper cylinder area and damaging dry starts during the initial starting period.

### Railroad Car Lubricant

A railroad car lubricant for roller bearings has been announced by the Gulf Oil Corp., Pittsburgh. This new lithium soap-base grease is available under the name "Gulf-crown RR." It is approved under Association of American Railroads Specification M-917-56.



GRIND CRANKSHAFTS IN THE BLOCK!
The Winona Lethelek Crankshaft Grinder has given fast, accurate service in the Automotive field for over 18 years. Now it's available to the Diesel field. With a new large hook, the standard grinder will now grind shafts up to 3½" in diameter in the block!
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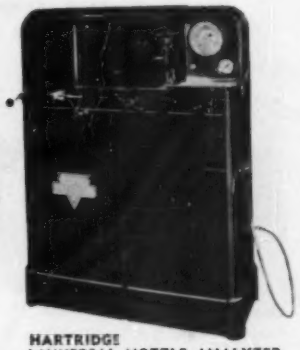
Precision
NOZZLE RECONDITIONING

It requires precision equipment! Here is the HARTRIDGE equipment that has won approval of O.E.M. and repair specialists the world over for reconditioning *all* makes and types of diesel nozzles.

HARTRIDGE NOZZLE GRINDING & LAPPING MACHINE

Ensures perfectly concentric nozzle bodies and needles with a fine finish. Its immense scope, speed and ease of operation cut nozzle servicing costs.



HARTRIDGE UNIVERSAL NOZZLE ANALYZER

Meets every demand of fast, accurate nozzle testing. Permits precise observation of *entire* nozzle action and spray pattern. Single dial records time and pressure readings. New injector receiving clamps eliminate pipe connections.

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Sales & Service, Inc.
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Telephone MAdison 2-3103 or 2-6730

EXCLUSIVE HARTRIDGE DISTRIBUTOR IN U.S.A.

# new literature

### Retaining Ring Catalog

A 24-page catalog containing descriptions and illustrations of all their currently available retaining rings, pliers and accessory tools has been published by Waldes-Kohinoor, Inc.

Catalog No. RR 10-58 includes: "Selector Guides" to the company's 20 standard ring series and 30 representative "special" rings; purpose and advantages of basic types of rings for axial assembly; basic ring types for radial assembly; ring types for end-play take-up; and self-locking ring types; 75 representative ring applications; and a section on assembly tools.

### Micro-Klean Catalog

Depth-type fiber cartridge filters for full-flow filtration of all types of fluids are presented in the new Micro-Klean Catalog No. 53-101 of the Cuno Engineering Corp.

Complete information is given on advantages of Cuno's "graded density" cartridge construction. Selection of proper filter and filter cartridge for any application requirement is facilitated by the Micro-Klean selector chart, cartridge life curve, flow rate table, dimension, weight and installation data.

### High-Speed Generators

Electric Machinery Mfg. Co. publication 2100-PRD-250 describes a line of standard, high-speed generators. These are available from 3.75 thru 62.5 kva, 60 or 50 cycle, single or three phase, in all standard voltages below 600, both in single or two-bearing construction.

These E-M generators are of the revolving-field type with direct connected d-c exciters. They can be furnished as packaged units complete with built-in automatic voltage regulators.

### Manometric-Electronic Pressure Switch

For engine testing, automatic control systems, etc., a precision pressure switch capable of extremely accurate and sensitive response has been developed by the Meriam Instrument Co. Bulletin A-11 tells how this unit, consisting of a contactor manometer and a relay-power-supply package is used for alarm signalling and/or control in applications involving pressure, vacuum, differential pressure, flow and liquid level.

Use of a special indicating fluid (Sp. Gr. equals 1) gives a make-or-break control sensitivity of 0.005-in. of water. The instrument can sense pressure increments as small as 0.003 oz per sq in.

Switching functions are handled by a Manotac relay-power unit which operates on 110-v ac power.

(*Continued on Page* 55)

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**Expert Factory-Trained Personnel**
**Factory-Approved Equipment**

Fully equipped Governor Dep't. Left to right: Aircraft, Railroad, Industrial and Automotive Governor Test Stands.

***Complete facilities for Woodward, Farris-Pickering, Marquette and Pierce Governors***

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**GO RIGHT NOW** WITH...

**KIM Hotstart electric pre-heater**

Just plug KIM into the electric circuit. It draws cold water from the engine, heats it, then circulates it back through the engine. *Result*: quick starts regardless of cold weather; elimination of warm-up time; reduced engine wear and maintenance; responsive power the instant it is wanted. Thousands in use.

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*clean* FASTER, BETTER . . . *at* LOWER COST!

Lix cleaners are so effective that diesel cleaning time is shortened to a very minimum—cut costs 'way down. Lix **soaks** away all grease, grime, grit and caked carbon —no brushing or scraping is necessary. Lix cleaners are **harmless** to all metals during cleaning cycle.

Lix Cleaners are **safer**—are of low toxicity, are not a fire hazard. Longer life without frequent charges, too.

There's a Lix Diesel Cleaner for any diesel cleaning job: **Spray** type, **Tank** type, **Electric Equipment** cleaners . . . **Non-Chlorinated** or **chlorinated.**

Write, wire or phone for literature to cover your particular needs.

THE Lix CORPORATION (OF MISSOURI)
"Leadership in Industrial Cleaning"
300 West 80th St.–Dept. D2
Kansas City, Missouri

Amazing new LIX CARBURETOR CLEANER cleans carburetors FAST, SAFELY! Parts come out looking like **new!**

# KIENE® DIESEL PRESSURE INDICATOR

gives compression and firing pressures faster

SIMPLE
RELIABLE
COMPACT

Send for Bulletin K-100

The Model K-100 Kiene Pressure Indicator accurately measures compression and firing pressures — assures the proper maintenance of diesel engines — helps prevent costly down time. Only one moving part — no friction or inertia effects — no complicated adjustments.

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE., FRANKLIN PARK, ILLINOIS


## new literature

(*Continued from Page* 52)

### Data Sheet On 40-Micron Breather Filters

A 2-page, 2-color, 8 1/2 x 11-in., 3-hole punched engineering data sheet (No. 101) can be obtained from the Bendix Filters Div. of Bendix Aviation Corp. It describes a line of 40-micron breather filters for free flow of clean air into hydraulic fluid, fuel and oil reservoirs.

The file sheet includes photos of the filters, air-flow pressure-drop curves, operating description, cross section drawings and specification tables.

### Flexible Metal Hose Connectors Catalog and Price List

What is said to be the world's largest selection of standard flexible metal hose connectors is illustrated, described and individually priced in the Cobra Catalog #658. Also included is the recently introduced line of hot water line connectors.

Complete specifications and installation information are given.

### Hydraulic Components For Mobile Equipment

A folder Bulletin 1502, reviews directional control valves, accumulators, cylinders, hose assemblies and tube fittings. It is issued by the Parker Hydraulics Div., Parker-Hannifin Corp.

### Got Any Shock, Noise Or Vibration Problems?

"Dynafacts" a publication issued quarterly by the Lord Mfg. Co. keeps you abreast of the latest developments on shock, noise and vibration control through use of their bonded-rubber products. Lord will send this magazine free of charge to product designers and other personnel interested in the field of shock, noise and vibration control.

The latest issue of the magazine has a section on automotive mounting systems which is of special interest to those in our field. Covered in detail are applications involving mountings on truck transfer cases, radiators, tractor hoods, truck cabs and crawler engines.

### Air-Jacketed Silencers Do Two Jobs

How air-jacketed silencers suppress engine noise while they ventilate engine room and surrounding areas is told in an illustrated, brochure by The Maxim Silencer Company. The brochure by this subsiduary of the Emhart Mfg. Co., includes descriptions, dimensions and applications of nine models of air-jacketed silencers.

### Automatic Controls For Engines and Compressors

An engineering application bulletin on automatic controls for engines and compressors has been prepared by The Cooper-Bessemer Corp.

Bulletin No. 87, entitled "En-Tronic Pipeline Control" describes equipment for automatically starting, loading, capacity control, regulating and shutting down pipeline compressors.

"En-Tronic Control" equipment also applies to other types of power machinery such as gas, diesel and gas-diesel engines, as well as motor-driven reciprocating and centrifugal compressors.

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## new literature

### Pipeline Aftercooler Line For Air Compressor Service

Ross' new line of pipeline aftercoolers are designed to cover conditions encountered in industrial air compressor service. Bulletin 302.6Kl by American Standard, Ross Heat Exchanger Div. gives complete details.

Designated Type A-100, this series is fully standardized to eliminate the high engineering costs and long delays involved in custom fabrication. All features including: steel shell construction; corrosion resistance; removable tube bundle; packed floating head; non-metallic baffles; and a new moisture separator using centrifugal force to remove entrainment from the line are covered in the bulletin.

### Hydrostarter Maintenance Manual

A new maintenance manual, Form 6SE143, containing latest instructions for overhaul and proper maintenance of the G.M. Hydrostarter system is now available. The new manual supersedes Form 6SE108 and contains detailed information on disassembly and assembly of all major components in the system.

Also included are complete lubrication and preventive maintenance instructions, trouble-shooting charts, and all service tools designed specifically for servicing Hydrostarter. The manual will familiarize service personnel with the system and enable them to provide better service on this product. This manual may be procured from G.M. Diesel Sales and Service outlets.

### Insulated Blankets And Housings

Pre-Klad insulated blankets and housings, factory-sheathed by Johns-Manville in heat resistant foils, are now made to fit unusual shapes and permit low-cost, assembly-line installation for service to 2000°F. They have been used successfully for diesel manufacturing applications, gas turbines and other services involving insulation against high temperatures.

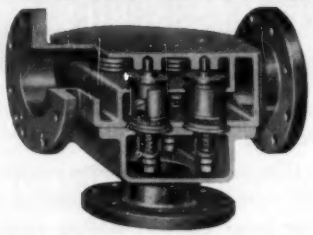
In a new illustrated folder, Johns-Manville describes how Pre-Klad can be used to fill industry's ready-to-use component requirements. The two-color folder summarizes Pre-Klad's unique properties and advantages.

The bulletin includes complete cell data on the entire line from 10 to 1650 ampere hour ratings, curves on discharge characteristics, rack data, accessory details, and a complete listing of the company's sales and service offices.

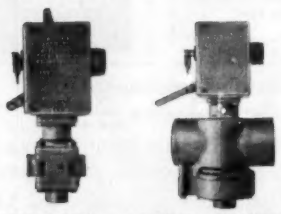
### White Diesel Catalog Summarizes Oil Field Line

The complete line of drilling engines, diesel-electric drilling rig power plants, and engine-generator sets for oil field applications by the White

AMOT ENGINE CONTROLS

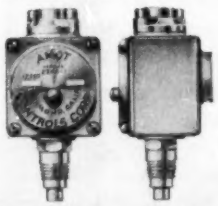


THERMOSTATIC VALVES, for jacket water and lube oil temperature control. Self contained, modulating, use no external bulbs. Sizes 1½" to 6". Temperature settings 75°F to 195°F.



MECHANICAL SAFETY CONTROL VALVES, used to shut down engines and compressors in event of oil pressure failure, overspeed, overheating of jacket water or lube oil, etc.

VENTED GAS VALVE, diaphragm operated will shut off the fuel gas and vent the manifold when used on internal combustion engine applications. Made in 2", 3" and 4" sizes.



SAFETY CONTROL SWITCH will flash warning signal, sound an alarm or close a solenoid fuel valve on overheating of jacket water or lube oil, or pressure failure of lubricating system.

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Diesel Engine Div. of the White Motor is described in a 20-page bulletin.

Bulletin #106 summarizes performance characteristics of 26 Superior engine models from 200 to 2150 hp and 150 to 1500 kw. These include both naturally-aspirated or supercharged units operating on natural gas, diesel, or dual-fuel. Action and product photos, cutaway and dimensional drawings, graphs, and specification tables for ready reference are included in the bulletin.

### Woodward Governor Oil Level Decal

Your Woodward SI and PG governors were not designed to operate with the ball heads partially or completely immersed in oil. These conditions are an open invitation for unstable governor operation. To try to prevent this situation from occurring, the oil glass hole has been lowered in the casting one quarter of an inch. As a final warning, all PG and SI governors are shipped with an oil level decal pasted beside the oil sight glass to call the operator's attention to the proper oil level.

These decals have a way of disappearing in the wear and tear of service, overhauls etc. If you need a fresh supply they can be obtained from the Woodward Governor Co.

### Motor and Electrical Equipment Failures Predicted

A maintenance procedure that enables failures to be predicted in motors and other electrical equipment, is described in a new issue of "Instrument Application Notes", Bulletin 2-60.1 prepared by Associated Research, Inc.

Periodic insulation resistance tests are made with an improved direct-reading megohmmeter that requires no computations, cranking or leveling. A chart is then drawn that indicates these resistance changes and thus the breakdown of motors and other electrical equipment can be forecast and action taken.

This procedure is also applicable to generators, capacitors, switch-gear and transmission equipment.

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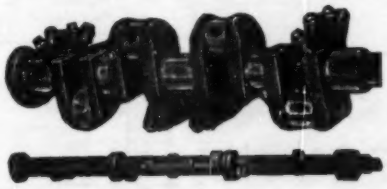
Above direct-connected diesel-electric unit is complete with air compressor, air starting tank, closed circuit cooling heat exchanger, modern switch board with oil circuit breaker, and meters. Unit has been run less than 8 hours since overhaul. May be started and operated at full load for inspection. Unit was purchased new in 1947. Contact Lincoln Electric Cooperative, Inc., P. O. Box 328, Eureka, Montana.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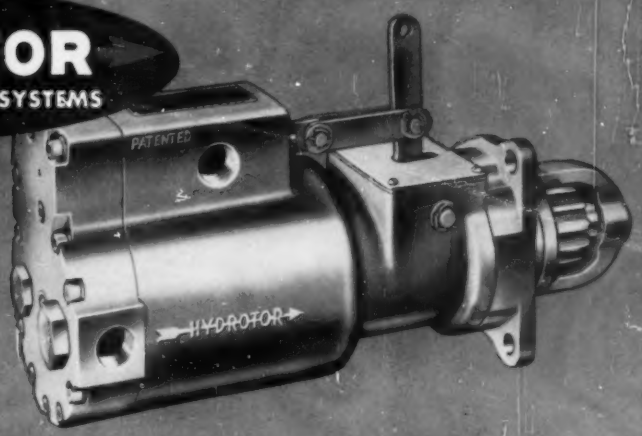


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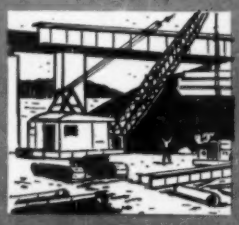
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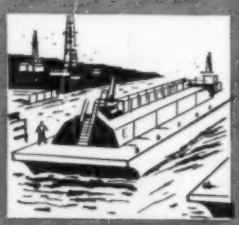
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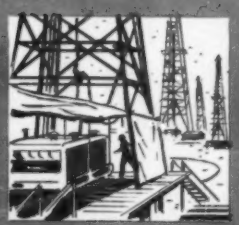
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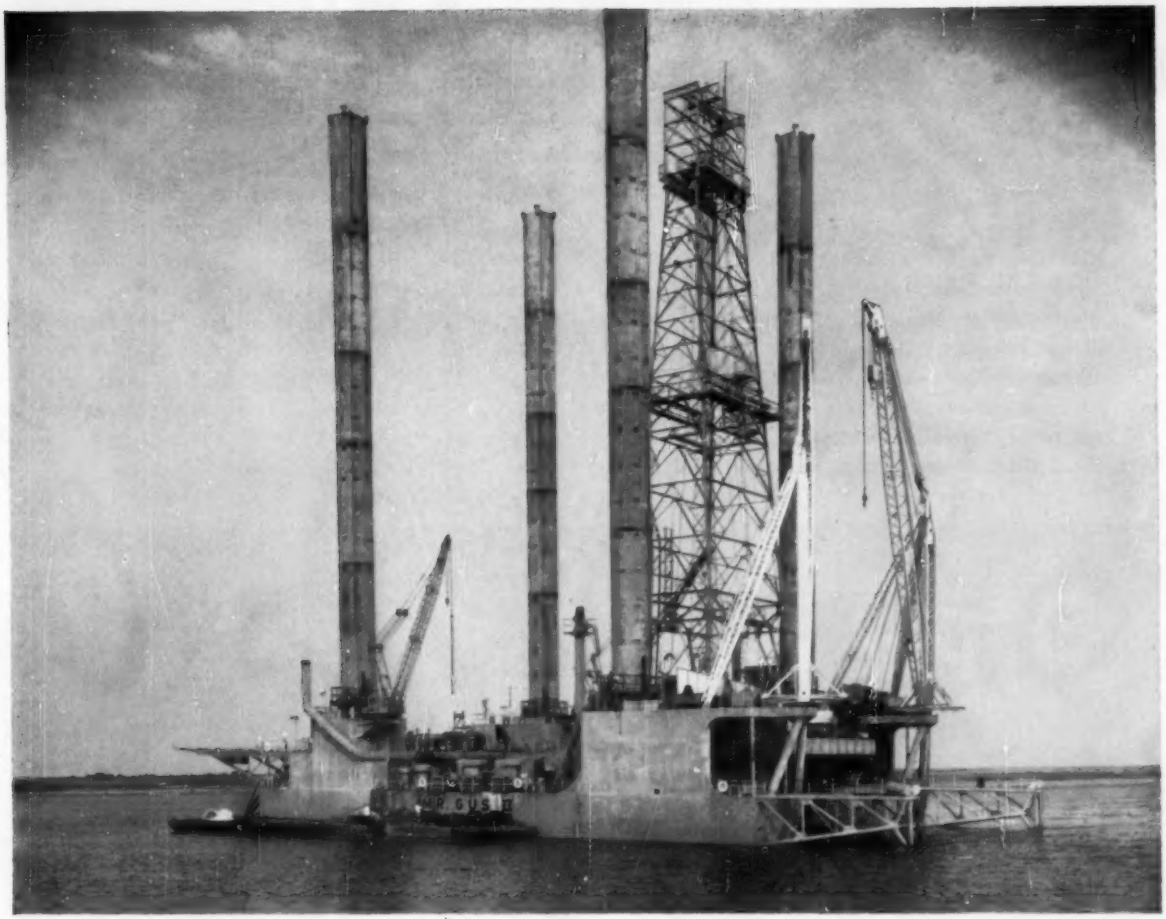

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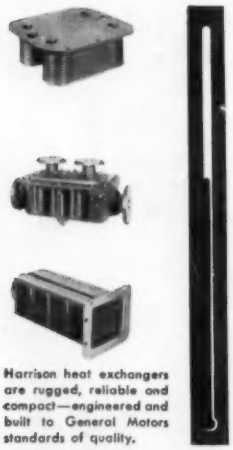

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